

# American Artisan

Founded 1880

The Warm Air Heating  
and Sheet Metal Journal

Vol. 95, No. 13

CHICAGO, MARCH 31, 1928

\$2.00 Per Year

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"It must be CLEAN heat!" That's what's uppermost in the mind of every furnace buyer. And that's an absolute certainty to buyers of the Waterbury SEAMLESS Furnace. Its heavy welded steel body is completely and permanently gas-tight. Even the front is welded to the feed and ash chutes. There's no chance for smoke, gas or dirt.

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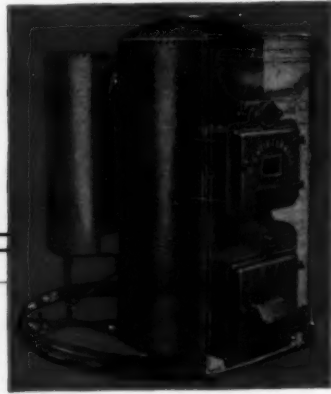
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the original



**Steel Furnace**

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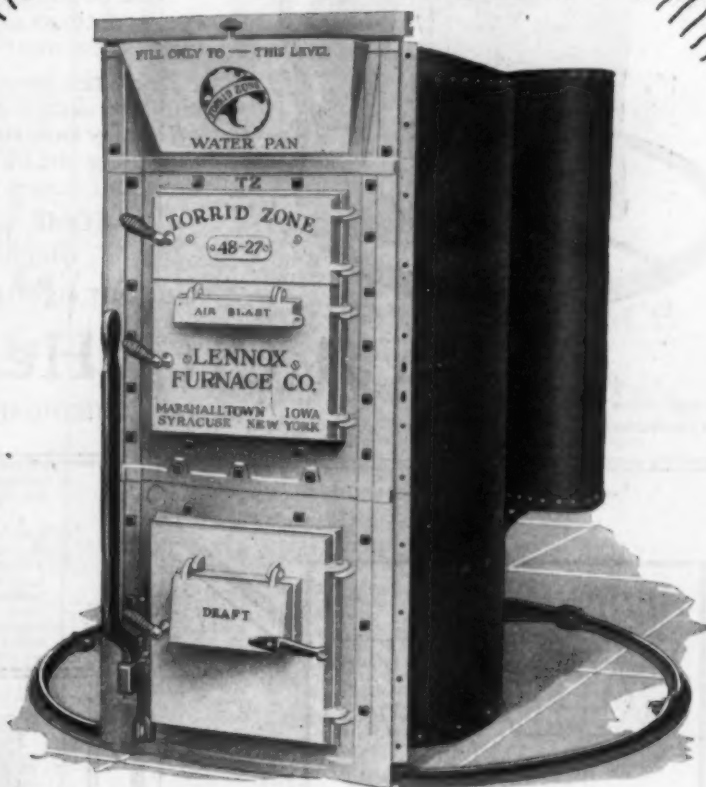
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**LARGE CRESCENT RADIATOR** with 8 additional set of smoke travel for maximum efficiency.

**BRICK LINED FIREPOT.** Bricks and grates easily replaced through the feed doors.

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*Get our agency proposition--it's interesting*

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**RYBOLT**  
FURNACE

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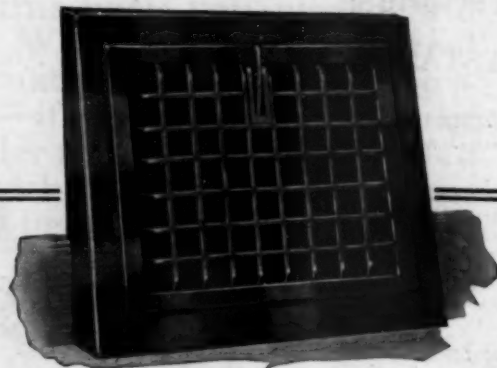
**D**O you want to make more money in the furnace business?

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Write us for further particulars if interested.

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ASHLAND, OHIO



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of all registers, combining air capacity, decorative and concealing features.

Designed to conform with the Standard Code so they fit all standard boxes.

Auer Patented mechanical features make it perfect in operation,—quick and easy to install.

*Auer's Save Hours and Dollars*

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Cleveland, Ohio



## WISE

### The Better Furnaces

**new  
WISE  
Improvements**



WISE OPEN DOME  
CAST FURNACE

THE New Wise Open Dome is improved with the Wise Cellular Firepot.

It is One-Piece and heavily constructed.

It has a series of air cells which extend from bottom to top which enable the air to become pre-heated before entering above and into the fuel. This supplies a continuous and evenly distributed air blast.

Another feature is the Elbow Shaped Flue Collar on Inside of Radiator which is turned up so all of the heat must follow the castings to the top before entering flue.



WISE 20 SERIES CAST  
FURNACE

**new  
WISE  
Ideas**

THE Famous Wise 20 Series has added still more fame for itself since this new Patented radiator appeared.

The feed chamber and the top radiator are so constructed as to allow communication between them which brings the opening of the fire flues of the radiator directly into the feed chamber, making the flues readily accessible for cleaning through the upper feed door. The dirt falls directly into the fire-pot, eliminating the necessity of taking the soot out by means of a narrow neck passage. This is a big advantage to the owner as a radiator that is easy to keep clean will be kept clean. And this means increased heating efficiency. This improved Wise Furnace has a New Cellular Fire Pot that provides complete combustion.

**a  
New Steel  
Furnace**



WISE STEEL FURNACE

TO enable you to confine your quality furnace business to one house the Wise Steel Furnace was created. Notice that the Wise Steel Furnace is a better steel furnace having features that make it last longer where others have weak spots.

The bottom of the radiator on the Wise Steel Furnace has a Cast Iron Soot Box and Clean Out.

This you know is the big weak spot in other steel furnaces. The Wise Steel Furnace like all Wise furnaces is Guaranteed high quality. It possesses all the latest scientific heating features and all modern conveniences. It is riveted and welded and has special design grates.

Write for the new Wise catalog, No. 23, just out and special circulars illustrating these New Wise Furnaces and features in detail. Be a Wise dealer now and for all time.

**The Wise Furnace Company**  
AKRON, OHIO

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Then, just naturally, you can make better sales, easier sales.

You can tackle the big jobs where they are talking radiator systems and beat them at every point.

The new Series "C" Moncrief is the better furnace you need to build a better business on.

Write for the particulars of our proposition.

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Eastern Office, Room 1306, 11 W. 42nd Street,  
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The Crawford Heating Co., Steubenville, Ohio



# MONCRIEF FURNACES

March 31, 1928

## SUCCESS HEATER MANUFACTURING COMPANY

MANUFACTURERS OF

WARM AIR HEATING SYSTEMS

DES MOINES, IOWA

January 1, 1928

Miss Etta Cohn,  
American Artisan,  
Chicago, Illinois.

Dear Miss Cohn:

It is a pleasure to write you regarding our opinion of the American Artisan as an advertising medium for Warm Air Heaters.

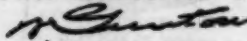
The knowledge we obtained from using several different publications has satisfied us that the best results were being obtained from our advertising in the American Artisan and for this reason we are limiting our advertising for 1928 to your magazine.

The results we have obtained is, to say the least, all we expected, and we take pleasure in handing you herewith our order for twelve front covers for the year of 1928.

With best wishes for the success of your publication, and with kindest personal regards, we are

Yours very truly,

SUCCESS HEATER MANUFACTURING COMPANY



Manager of Sales.

W. Gunton  
PB

**EASY TO INSTALL**  
CLAMPS ON  
NO BOLTS  
REVERSIBLE



**CUTS LABOR 1/4**  
EASY TO REMOVE  
NO TEE JOINT  
WRITE FOR PRICES

**TEELA SHEET METAL CO. — OSHKOSH, WIS.**

**The NEW TEELA BOLTLESS REVERSIBLE CHECK DRAFT**

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This burner heats the radiating surfaces evenly and requires no adjusting. The Wonder Worker Convertible Burner is very easily installed and can be removed in a few minutes.

Know all about the Wonder Worker Burner and Gas Burning now—let us send you information about the Popularity of Gas as fuel and this fast selling and profitable Burner.

**WONDER WORKER**



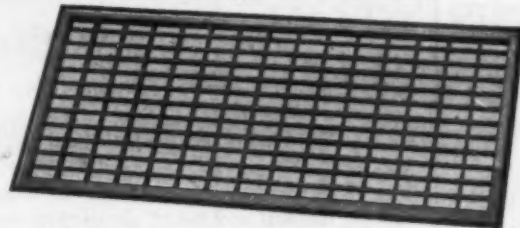
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NOW MADE WITH BEVELED EDGES

"Fabrikated" Faces are rigid and do not sag or change shape in use. Any size. Any finish. You certainly should look into "Fabrikated!"

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Founded 1880

Published to Promote  
Better  
Warm Air Heating  
and  
Sheet Metal Work

# American Artisan

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### THE MOST VALUABLE THING IN THE WORLD

*I am the most desirable thing in life. Without me no one can be healthy, happy or useful.*

*The hidden wealth and vast resources of this earth would have no value without me.*

*I am the great developer of man. No other agency has called forth so many of his hidden treasures, developed more power of mind and body than I have.*

*Men and women who try to get along without me are characterless, selfish, undeveloped, useless and unprofitable members of society. I am behind every fortune, every art and science, every achievement, every triumph of man.*

*Rich men and poor men alike often try to find substitutes for me, hoping thereby to secure a larger measure of happiness, peace, and satisfaction, but they are always bitterly disappointed. Instead of gain, every substitute for me brings them infinite loss.*

*As the creator is greater than the creature, so I am greater than wealth, power, fame, learning, or any other acquired possession or quality of man, because I am the source through which he acquired them.*

*I am—Work.*

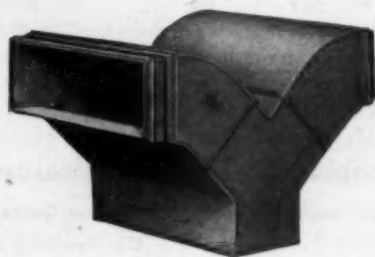
*Union  
made  
Pipe and  
Fittings*



*Made  
better by  
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sheet metal  
workers*



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corners.  
All angles  
are  
curved  
for even  
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*Until You See It You  
Haven't Seen The*

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**The FAULTLESS—Series "C" FURNACE**

*A New, High Class Construction*

After building successful furnaces for 50 years, we now offer the most complete and most attractive standard style in the market. Not a cheap or commonplace feature can be found in it. Our aim was to make as *good* a furnace as could be constructed, in all respects in line with the ideals and experience of the National Warm Air Heating and Ventilating Association.

**Its Conspicuous Superior Features Are:**

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| Larger Radiator than other makes.     | Cogless Grates.   |
| Greater Heat Pipe Area.               | Gas Ignition (or Smoke Consumer)<br>is part of regular equipment. |
| Greater Free Air Space.               | Brass Hinge Pins.   |
| Heavy Castings—strongly ribbed.       | Brass Bolts in grate bar panel.                                   |
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| Gas Baffle Door.                      |   |
| Large Feed Door Opening.              |   |

Dealers who believe that **QUALITY** furnaces and work are the only profitable kind, should see this furnace and get our attractive proposition.

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MAKERS OF FAULTLESS FURNACES FOR 50 YEARS

116-18 WOOSTER ST.

NEW YORK CITY





# American Artisan

The Warm Air Heating and Sheet Metal Journal



Vol. 95

CHICAGO, MARCH 31, 1928

No. 13

## REPOSSESSION OF ARTICLES SOLD ON INSTALLMENT PLAN INCREASES AS DOWN PAYMENT DIMINISHES

By GEORGE J. DUERR

THE observance of three fundamental principles are necessary to the successful extension of credit on the installment or partial payment plan, according to a recent investigation on the "Social and Economic Consequences of Buying on the Installment Plan," made by the Wharton School of Finance and Commerce, University of Pennsylvania. They are:

1. Careful investigation of the customer's ability and willingness to meet his installment obligations when these become due.

2. The initial or down payment on the article purchased should be large enough to make the purchaser feel that he is the owner rather than the renter of the article purchased.

3. The length of time over which the payments are spread should not extend beyond a period where the down payment plus the amount owing to the lien holder is less than the probable selling value of the article. The nature of the article; that is, its natural span of life, would govern to a large extent the length of time over which the payments are to be spread.

These, in brief, are the principles that are essential in the formation of a sound installment credit structure, and that were published in the *Annals of the American Academy*

of Political and Social Science, January, 1927.

To elaborate: The first rule seems so simple and so reasonable that it would seem no business man would neglect it, yet it is a fact that in the case of a large proportion of repossessed articles the default in payment began the very first month after the purchase. What does this indicate? Simply that the causes of

### WHAT ARE THE PRINCIPLES OF SOUND INSTALLMENT CREDIT?

1. *A thorough investigation before the credit is allowed into the customer's ability and willingness to meet the payments as they become due.*

2. *The requirement of a down payment that is large enough to instill a sense of ownership in the article purchased, rather than risk the possibility of the customer regarding his relationship as that of renter.*

3. *The time over which the payments are extended should be governed by the life span of the article purchased.*

default were present when the sale was made and that these causes, in a large number of cases at least, were overlooked because of carelessness in the investigation or because of a policy of granting easy credit in order to make sales, such as for instance, the selling of a heating system to a man who is already burdened with debt to an extent where keeping up the payments on the various articles thus purchased will become a hardship and likely to produce discouragement. Even though a lien on the property is taken to insure payment of the heating system, the litigation involved and the time consumed away from ordinary business matters will more than consume the profit anticipated.

Therefore, a credit investigation should include an inquiry into the customer's income, occupation and debts. The customer's statements should be verified, as the relation between his income and all of his present obligations is important.

In regard to the second essential principle, that of requiring the initial or down payment to be large enough to instill a sense of ownership in the customer, it should be noted that without a sense of ownership in the purchase made the number of repossessions will be exceedingly large, and repossession is undesirable from every standpoint.

In many cases a standard down payment of one-third or at least 30 per cent of the purchase price should be demanded. The fact in the case of automobiles has been proved that the losses become increasingly greater as the down payment gets smaller.

The third principle, or the requirement that the time payments do not extend over too great a length of time, is self-evident. And in any case the time should not extend over more than twenty-four months.

Concerning automobiles, the National Association of Finance Companies has recommended the maximum period of maturity of promissory notes covering new passenger

cars as twelve months, payable in equal monthly installments. C. C. Hanch, general manager of the National Association of Finance Companies, has also made a study of losses in connection with the length of time over which the payments are spread. He found that *losses increase proportionately as the time limit is increased beyond twelve months.*

Some people believe that there are other factors which should be taken into consideration. They think credit granted for producers' goods is sound, that granted for consumers' goods is unsound. Credit granted for necessities, providing other requirements are met, is sound; that granted for luxuries is unsound. From the standpoint of danger to the general credit struc-

ture, these factors are not important. The important requirements are those set forth above, which are concerned with the personal credit investigation into the purchaser's ability and willingness to meet his obligations when they are due, the cash payment which is made at the time of sale and the length of time over which the deferred payments are spread.

## *Business Success Is Tied in With Human Relations* *Thorough Understanding of This Will* *Assist Executive Greatly in Handling Men*

By CLARENCE H. HOWARD, President Commonwealth Steel Company

THE art of human engineering is one of the oldest arts in existence in its underlying principles, but it is one of the newest in its recognition as a science in industry. Human engineering is really of the same nature as mechanical engineering in that it arrives at the solution of its problems in much the same way.

What does mechanical engineering do? It solves specific problems by working them out carefully in the light of universal principles. It knows what it is doing. It does not proceed on mere enthusiasm. Take an illustration. Suppose my plant is called upon to supply certain parts of a locomotive. Do we get all hands to give three cheers and then go ahead? No; we hold a meeting of the engineering staff. The definite requirements to be met are put before them—the weight of the locomotive to be built, the tractive power to be exerted by them, the speed which they are to make, the special conditions of construction. When all this has been entirely digested, the rest is the application of principles.

These principles are the property alike of all engineers. No one can monopolize them. They work everywhere; an engineer brought up in the United States never gives a thought to the possible failure of engineering principles if called on to do professional work in South Africa. When he is designing he is

not thinking primarily about steel. He is thinking about accepted principles for taking care of known stresses and strains in his work. He must stick to them, for each principle is characterized by individuality and the finished product is the result of harmonious relations with all principles.

But when we step out of the mechanical realm into the realm of human relations, what a contrast there is! How imperfect our efforts are! What a difference there is between the confident, efficient way in which we go ahead in mechanical engineering and our blundering in the realm of human engineering.

In order to be successful in human engineering, we must do just what we do in engineering of the other sort. In mechanical engineering, if you are going to design in steel, you begin by treating steel as steel. You find out the principles that govern it; when these are determined you can forget the material and think only of these principles. Now the first essential of human engineering is being willing and able to treat men as men. This is the first step toward finding out the principles that govern the employment of men in useful tasks. When we have determined these principles, we may then go ahead with confidence.

Now the first essential in the treatment of men as men is to re-

member that the all-important thing about man is his power to think. The welfare of the man is more important than tools or machinery. The appeal of human engineering is always to a man's mind. When you hired a man you did not hire him according to the color of his whiskers, or hair, or mustache; you hired his thought.

### **The Right Way and the Right-of-Way**

Organization, to be most effective, must have a common objective; one which all the units of the organization see and understand; and this objective should be so coupled with individual benefit and group benefit as to furnish the most powerful incentive toward individual and group effort. This is simply the adoption of the principle of right as the unerring law of action, and we all acknowledge that the right way gives us the right-of-way. When causes are right, effects take care of themselves. Now look at this fundamental requirement in the light of the ordinary principles of mechanical engineering. Did you ever see a successful mechanical device in which everything was not shaped to the accomplishment of a definite object? Did you ever see an efficient machine which had gears that did not mesh, bearings that were not true with each other and parts that had nothing to do with the work for which the machinery was constructed? What sort of



engineering is it that designs the mechanical device with the fullest recognition of the principles of coordination and inter-dependence, and entirely ignores these principles in human relations? Men are much more precious material than steel. Is it too much to ask that a human organization be built with the same scrupulous attention to principle that governs a well-designed locomotive?

### Character Breaking or Building?

In organization discipline, again, the human engineer can learn from his mechanical brother. Here is an untrained man who is taken into a mill as an oiler. Partly through ignorance and partly through carelessness, he permits dust and sand to get into the bearings of a shaft that is running under a heavy load at a high speed. Before long the bearing is running hot. Suppose that the engineer in charge gives the oiler a cursing, "riding" him harder and harder until the man loses his self-control. For the time being he is reduced to the animal; he has ceased to be a thinking, reasoning being. That engineer, in doing this, has done exactly what the man whom he is reproving did, and under circumstances which rendered it far more blameworthy. He has put sand into the bearings of an important human relationship. He has increased friction where he should have avoided it. Suppose that instead of merely scolding, he patiently instructs. In so doing, he raises the man higher than he was; he builds up his character.

### "Positive Safety"

Consider the subject of safety in its proper term, that of the positive, and its opposite, danger, as the negative. Another term for the negative is *counterfeit*, and as there cannot be a counterfeit bill without there first being the true bill, we may rightly consider the positive as the true bill. A banker does not necessarily need to know all the various counterfeit bills in circulation in order that he might be protected from accepting one as genuine. All he needs to do is to

acquaint himself thoroughly with the true bill and that which does not resemble in every respect this true bill, he knows to be a counterfeit and, therefore, valueless. Thus, it is not necessary for us to visualize hazards, accidents and dangers in order to impress upon the thought the idea of safety first, for we are always safe when we are thinking in the terms of the positive.

### Mental Safety Zones

The desire to safeguard pedestrians has become so general that in some cities and towns safety zones and safety platforms are provided in the middle of the streets. As it is against the law for any vehicle to come within these safety zones, so it is against the law of the positive for the negative qualities of confusion, doubt, and fear to enter the thoughts of one who thinks only in the terms of the positive.

If we are obedient to the traffic law, we wait in the safety zone until the signal is given to go ahead. So if we are obedient to the law of the positive, we shall constantly dwell in safety.

Only a small percentage of accidents can be prevented by mechanical safeguards; the balance must come through the practical application of the Golden Rule, which is positive, constructive safety. *Safety first*, when properly analyzed, is the expression of *fellowship*. This positive viewpoint of safety is one of the most important factors in reducing accidents. Accidents have no essential part in the conduct of a successful business; they are unnecessary inefficiencies. Accidents were once considered inevitable, but out of the nightmare of the past has emerged a safe, practical, and orderly condition in industry.

The safety first movement is one of the greatest constructive conservation movements that has come among men. The economic losses in the country through accidents have been almost beyond belief. There is nothing more useless than an accident; the victim, his family, his employer, and his community are the losers.

We must have "humanics as well

as mechanics," which means in plain words, treating men as men, not as machines. I will give you a definition of the *fellowship* which I have worked out through years of earnest study, and application of its principles to business, which has proved a practical basis for putting all, from the office boy to the president, on the same plane.

### Fellowship

*Fellowship* is a comprehensive, vital force, always finding expression in the Golden Rule. It broadens our views, increases our abilities, enriches and purifies character. Its chief foundation-stone is cooperation.

Fellowship has no elements of failure, no racial or other prejudices, no hate, envy, jealousy, or who-shall-be-greatest.

### Service

High individual efficiency in organization brings greatest service to the customer in company product; and when service is right confidence is earned and success is assured. Service must be expressed in safety, efficiency, and economy, which enable one to profit with his fellow-man and community, but never at their expense—to live in a city, but not on it.

How is highest individual efficiency to be obtained? A skillful man not willing, or a willing man not skillful, is half a man. Efficiency is expressed through willing, skillful workmen, whom all are seeking in order to secure the acme of workmanship. What is skill? Skill is doing the right thing the first time. We must use wisdom in selection through a competent employment department to get skillful men, and the fellowship spirit and activities will make any reasonable man willing.

### Human Engineering

The most important engineering course today is human engineering, and fellowship is its basis. For if a man knows all there is to know about business and all other human activities, and has not fellowship, that he may work for and with others harmoniously, how can he utilize what he knows?



Human engineering is one of the most important factors in reducing labor turnover. It teaches that you cannot receive anything with a closed hand—you must open up first.

Safety work is found to be the scientific study of the right and orderly way of doing things. Good safety work makes even the humblest workman in any plant a safety man.

Fellowship is efficiency. One of our noted efficiency engineers made the statement that Jesus was the greatest efficiency expert the world has ever known. I asked him why, and he replied, "Jesus accomplished more, in less time and with less equipment and materials than anyone else"—and these are the fundamentals of efficiency.

Efficiency must be equally practiced by employer and employee. This will avoid antagonisms and misunderstandings, and will bring true coöperation, contentment, and success.

Another factor in efficiency and human engineering is poise, which has been defined as follows:

Poise is that state of consciousness which is at rest and peaceful when no one praises, and undisturbed when opposed, censured or misunderstood. To lose one's poise because of any disturbed condition only makes a bad thing worse.

This means that we must so conduct our business that it will command the respect and coöperation of the six factors in business which must be coördinated, namely, the employee, the employer, the man from whom we purchase, the customer, the stockholder, and the public. It necessarily follows that your business will then win the respect and coöperation of the community.

#### A Code of Practice

If I may sum up for readers of the *Executives Service Bulletin* how the science of service and fellowship built up sound relations for our business, I would do so in the Code for our Commonwealth Steel Workers which is as follows:

#### A True Commonwealther

Is Efficient; which means that he knows how to do his work—and does it willingly and skillfully. Skill is doing the right thing the first time.

Is Loyal to his country, to his family, and to himself. Being so, he will of necessity be loyal to his employer and to his job. A loyal, willing, skillful man means the acme of workmanship.

Is Steady in his work; always on the job, and is never late nor misses a day, unless absolutely necessary.

Is Cheerful and encouraging in all his contacts with his fellowmen in the shop and elsewhere. A smile is a wonderfully constructive harmonizer.

Practices the Golden Rule, which enables him to overcome all difficulties, and is the true rule of success in any undertaking.

Is a Fellowship man, and realizes that whatever his knowledge and ability may be, he can make them useful and effective only as fellowship enables him to work for and with others harmoniously.

Is Thrifty in all his habits. As he is wise and economical in the use of his own time and money, he will naturally be so in the use of his employer's time, tools and materials. Thrift is the abolishment of waste.

Is Safe in the shop, on the street, and in his home; rejoicing in his fellow workers' and his own safety, while producing safety devices to protect life and property on railroads.

Is Reliable, and can be depended upon to do his best in any situation. He tells the truth; is honest; and always keeps his word.

Also Thinks! This is named last, but it is first in importance, because he acts as he thinks. Therefore, as he thinks Efficiency, Loyalty, Steadiness, Cheerfulness, Golden Rule, Fellowship, Thrift, Safety and Reliability, he will manifest these things in his work and in his life and he will be a 100 per cent Commonwealther.

#### Carnegie Institute of Technology to Give Summer Course in Sheet Metal

Courses in Sheet Metal Work are receiving special attention in the plans for the eleventh summer session this year at the Carnegie Institute of Technology in Pittsburgh, according to an announcement. A combination course in Sheet Metal Pattern Drafting and Shop Work will be given for six weeks, from June 25 to August 3, in the College of Industries.

Although the course is arranged to be of primary benefit to teachers of industrial and manual arts, the announcement points out, the work is designed to have a special appeal also to undergraduates and to those employed in the trade who feel a need for further technical training.

In addition to the Sheet Metal Work, other departments of the Institute will give summer courses of six and eight weeks in length in Woodworking, Cabinetmaking, Electricity, Printing, Plumbing, Economics, Commercial Law, Mathematics, Psychology, Chemistry, Physics, Mechanics, Surveying, Coal Mining, and for teachers and supervisors of music and art.

#### J. W. Cooper, Springfield, Illinois, Says Impostor Is Using His Name

Another instance of misrepresentation for purposes of fraud has been called to our attention by J. W. Cooper, Springfield, Illinois. Mr. Cooper states that on three distinct occasions, once in St. Louis, once in Cincinnati and once in Chicago, a man thoroughly familiar with the warm air heating industry has represented himself to be Mr. Cooper or Mr. Cooper's brother and in that way has obtained "checks cashed" or "loans."

Mr. Cooper wishes the fact made known that this man is an impostor, and any furnace manufacturer approached by him should be on his guard against cashing his checks or lending him money. Mr. Cooper also wishes made known the fact that he has no brother.

The sheet metal and warm air furnace industries seem to be fair

targets for impostors operating throughout the country. Not long ago an instance was related to us where an impostor operating in Washington, D. C., had represented himself to a prominent Washington sheet metal contractor to be the son of a well-known sheet metal contractor in Indianapolis, and thereby "touched" the Washington contractor for \$20. This same operator then changed his scene of action to Pittsburgh and represented himself to be the same son of the Indianapolis sheet metal contractor, with the result that another \$20 changed hands. All the while this was going on, the real son of the Indianapolis sheet metal contractor was in California attending the convention of Masons.

Furnace and sheet metal men should be more careful about making the man who desires his checks cashed or a loan show his credentials. It's fine to be a good fellow, but it's much better to be sure that the man is the person he represents himself to be before "coming across" with the loan.

#### **Copper & Brass Now Using Women's Publications For Advertising**

Copper & Brass Research Association is now running a spring advertising campaign using about 80 daily newspapers, with the copy placed through Dorrance, Sullivan & Company, New York agency.

Selection of newspapers on the list is based almost entirely on reports of building activity. In the present drive there is not an even spread over the country, the copy going for the most part where it is believed to be most needed. The present series will run to the second week in May, when it will be discontinued to be picked up again in the fall. Ivy Lee has charge of the advertising for the association at the present time.

The advertising plans in paid space are being broadened. It is expected additional newspapers will be used this fall. This spring women's publications are being used for the first time, with the copy stress-

ing the idea that installation of brass pipe fixtures is an essential to health protection.

#### **H. P. Sigwalt, Milcor, Enters Advertising Agency Field**

H. P. Sigwalt, who for the past five years has been advertising manager of the Milwaukee Corrugating Company, is entering the advertising agency field on April 1st, with the Cramer-Krasselt Company, Milwaukee, one of the largest agencies



H. P. Sigwalt

in the country, where he will take charge of the industrial advertising division.

As former secretary and at present third vice-president of the National Industrial Advertisers' Association, vice-president of the Milwaukee Advertising Club, and formerly president of the Milwaukee Association of Industrial Advertisers, Mr. Sigwalt is widely known in the advertising profession, as well as in the sheet metal trade.

His broad and varied experience in the advertising department of Geuder, Paeschke & Frey Company, Milwaukee, and as advertising manager of Federal Motor Truck Company, Detroit, Michigan; American Optical Company, Southbridge, Mass.; T. L. Smith Company, Mil-

waukee, and Milwaukee Corrugating Company, Milwaukee, has helped him develop an advertising-merchandising perspective which should prove valuable in the advertising agency field.

D. C. Smith has been appointed to succeed Mr. Sigwalt as advertising manager of Milwaukee Corrugating Company.

#### **Lamneck Not to Consolidate With or Purchase Other Furnace Fittings Plants**

The following open letter to the trade has been received from W. E. Lamneck, president of the W. E. Lamneck Company, 416 Dublin Avenue, Columbus, Ohio, relative to the possible merger of that company with other company or companies making furnace fittings and other furnace material:

"There has been much talk in the trade and industrial circles recently of possible purchases, mergers and consolidations, and the furnace fittings industry has come in for its share of excitement and gossip.

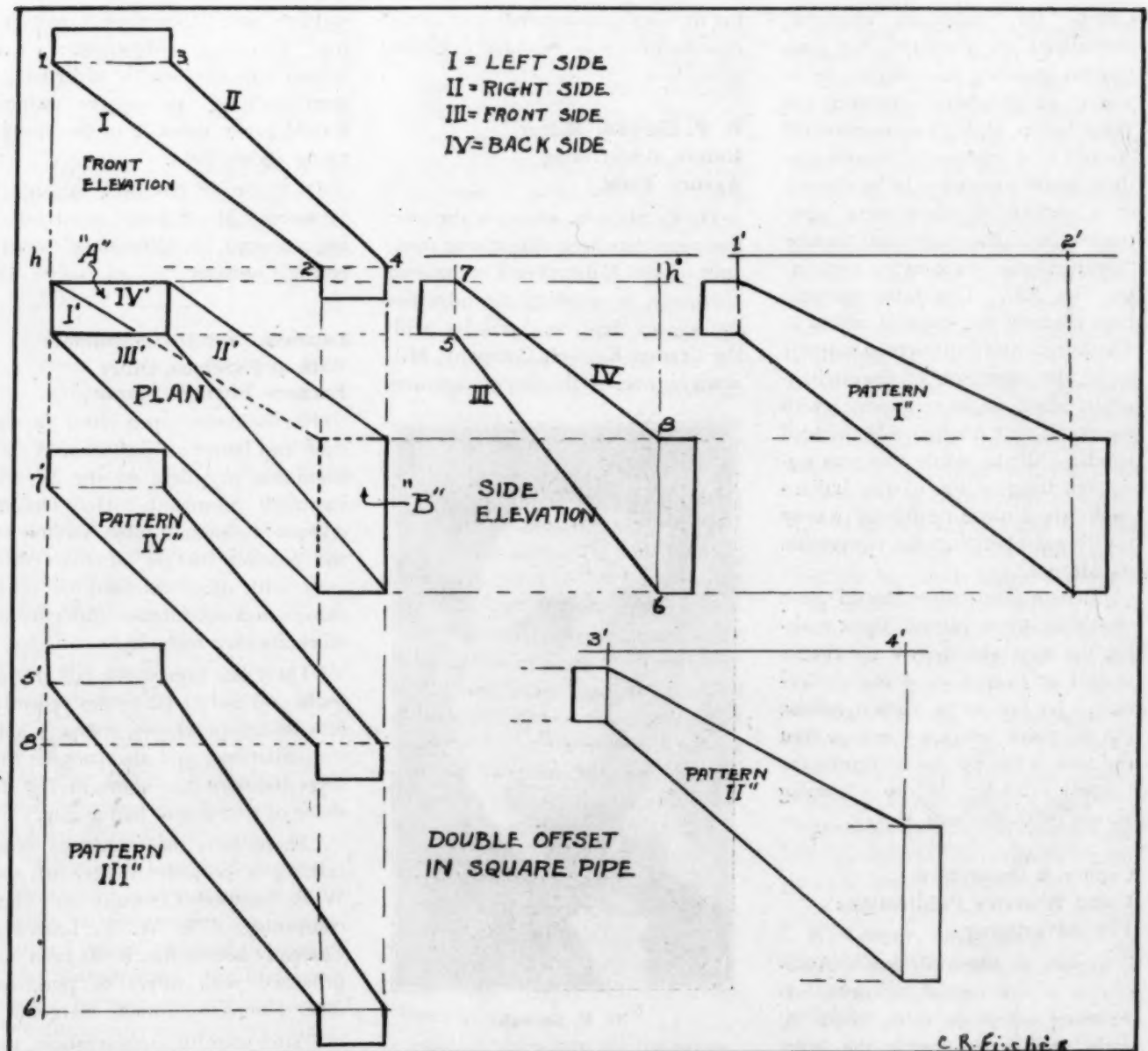
"There have been rumors concerning a possible merger of the W. E. Lamneck Company and other companies. The W. E. Lamneck Company admits that it has been approached with offers to purchase other plants or promote mergers.

"After careful consideration, the officers of the W. E. Lamneck Company could not discover any great advantage in the suggested purchases or consolidations and the plans have received no further consideration—and for that good reason the W. E. Lamneck Company will continue to operate independently as heretofore."

THE W. E. LAMNECK COMPANY,  
W. E. LAMNECK, President.

#### **D. K. and Mrs. Swartwout, Sr., Spend Vacation in West Indies**

D. K. Swartwout, Sr., president of the Swartwout Co., Cleveland, accompanied by Mrs. Swartwout, have been spending several weeks has been spending several weeks vacationing in the West Indies.



Patterns for Rectangular Offset

## Constructing Pattern for Rectangular Offset as Done By C. R. Fischer

*Problem Development Should  
Interest Many Readers*

By O. W. KOTHE, Principal St. Louis Technical Institute

ONE of our friends, R. C. Fisher, Dorchester, Mass., recently sent us a drawing, such as we show in the accompanying drawing, which should be of interest to the readers. This off-set takes on a transforming shape from rectangle to rectangle and leans also in a diagonal position. For this a front

and side elevation is used. We show a plan to help illustrate the problem, although the plan is not absolutely necessary in the development of the patterns, since the front elevation and side elevation give the amount of girth and offset desired.

First draw the front elevation, giving the length of opening, as 1-3,

and also the height, as 1-h, as well as the offset h-2 and the narrow side of the bottom, as 2-4. This enables drawing the outline of the front elevation. By dropping lines we can then develop the plan by first developing the sections, as "A" and "B," placing them in the relation we wish them to be. This can also



be done by drawing the side elevation where 7-5 gives the width of section "A" and h'-8 is the offset of side elevation and 8-6 is the length of section "B." With these measurements the outline can be filled in, as plan, as well as side elevation as shown.

To develop the patterns, we can start with the heel of front elevation I, picking the girth 1-2 and setting it over to the right of side elevation, as 1'-2'. Drop stretchout line and then project points over from side elevation, which develops the pattern I". The same procedure is followed in developing pattern II, where 3-4 is used as the girth and is set as 3'-4' in pattern II". In developing the heel for the side elevation, or III, pick the girth 5-6 and set it as 5'-6 in pattern III". Then develop from the side elevation, giving the pattern as shown. Repeat this for the side IV of side elevation and set as 7'-8', and develop as before, giving the pattern IV".

These give the net patterns and edges must be allowed for assembling; whether it is a hammered lock for light metal or double seaming or for heavier metal, where the corners would, no doubt, be welded, no edges are allowed.

#### **Detroit Sheet Metal and Roofing Contractors Discuss Convention Casualties**

A check-up on the casualty list of Detroit members who attended the State Convention at Kalamazoo shows that most of them have recovered. Ernie Oberbeck is still confined to his bed and Duck Patterson is reported to be improving. Both failed to put in an appearance at the regular monthly meeting held at the Book-Cadillac on Tuesday evening, March 13. President Bill Busch is still nursing a few bruises sustained while acting as captain of the volunteer fire department. Secretary Bill Sullivan, erstwhile chief of the Detroit Police Department, cannot understand why the AMERICAN ARTISAN suggested that a vote of thanks be given the Kala-

mazoo Police Department when his quickly organized band were so active in preserving law and order during the convention.

Following a discussion of the many interesting incidents the regular meeting was called to order and Al Berschbach proceeded with the drawing contest. Al drew first prize and quickly pulled the cork. Mr. Lutz of Pontiac won second prize.

Frank Austin of the W. E. Wood Company gave a very interesting talk on organization and its possibilities. Mr. Austin has been very active in the General Builders' Association of Detroit and the Associated General Builders' Association of America. He explained several constructive movements which have been accomplished by these organizations and proved from their records that the organization of any industry is the only known method of correcting evils which cannot be handled individually. He urged support for the national lien law which has been sponsored by several organizations connected with the building industry. The thought, he said, behind this model law was to increase the responsibility of the contractor and reduce that of the owner so that owners would be more careful in their selection of general and sub-contractors. Mr. Austin's talk was greatly appreciated and a rising vote of thanks was given him.

Mr. Lutz spoke on the necessity of roofing and sheet metal contractors figuring their jobs so that a profit would be realized on every job.

Music was furnished by a jazz orchestra and the community singing was led by Bill Amelung.

#### **Sheet Steel Trade Extension Has New Tie-Up Sign for Contractors**

The accompanying illustration is that of a new decalcomania sign which the Sheet Steel Trade Extension Committee will have available within the next six or eight weeks

for distribution to the sheet metal contractors.

The Sheet Steel Trade Extension Committee has been doing a great deal of advertising of sheet steel service to the public. It is felt that some means should be made available whereby the sheet metal contractor can tie up with this advertising that has been and is now being done by the Sheet Steel Trade Extension Committee, in order that he can cash in on this advertising. Hence the sign.

The sign says in effect, "Here, you have been hearing so much about sheet steel. Well, I am an artisan in sheet steel, come in and talk it over."

The signs can be had for 10 cents apiece, just enough to pay for the postage, and can be placed in prominent locations where they will be seen and read by the public. They are of such a nature that they can be affixed to windows, the sides of a truck or anything else. They are practically indestructible, as they can be placed upon a window without interfering with the washing of that window. They are 9½ by 5 inches.

It is desired by the committee that all signs ordered should be ordered through local secretaries or through the National Association of Sheet Metal Contractors, although, of course, orders for them sent direct to the Committee's headquarters, Oliver Building, Pittsburgh, will be taken care of promptly.

#### **Republic-Trumbull Merger to Become Effective May 1**

Merger of the Trumbull Steel Company and the Republic Iron & Steel Company, recently approved by about 94 per cent of the outstanding preferred and common stock of the Trumbull company, following a previous approval by Republic shareholders, is expected to become effective as of May 1. Headquarters will be in Youngstown, and the Trumbull properties will be known as the Trumbull division of the Republic company.

## *A. J. Brandt Proposes to Establish Sheet Metal Research Laboratory at Mooseheart*

*Object: to Insure Success to Teaching of Vocational Training and Hence Quality Sheet Metal Workmanship*

"AN epoch-making occasion in the sheet metal industry," was the phrase employed by Rodney H. Brandon, Secretary of Mooseheart, to characterize a meeting, at which all phases of the sheet metal industry were represented, held in the Supreme Lodge Building, Mooseheart, Illinois, March 28, 1928, and at which Mr. Brandon presided.

The purpose of the meeting was to determine the feasibility of a plan to establish at Mooseheart a sheet metal research department, the objective of which would be the compilation of information that would later be put into the form of lesson sheets for use by sheet metal instructors. In this way the sheet metal instructor would be given a guide in his work that would insure success to his teaching.

There is at the present time a great dearth of such information. And the objective in the mind of J. A. Brandt, head of the Sheet Metal Department, Mooseheart, who conceived the idea, is to make it possible to raise the standard of the sheet metal courses now being used in vocational schools, in public schools having vocational educational courses, and sheet metal shops in small towns where the employer must train his own apprentices.

In this effort there will be no attempt to take away the instructor's individuality in teaching, but to place at his disposal complete, authentic information that will enable him to turn out boys who can make good in the sheet metal industry after they leave school. The supreme object is to obtain quality workmanship.

In order to accomplish the objective aimed at, Mr. Brandt suggested a plan of action that would make Mooseheart the headquarters of the

research department. There would be a director of research who would have charge of all of the research work, a resident secretary and treasurer, and a board of directors, made up of all factors in the sheet metal industry, in whose control the policies of the research would be vested.

Mooseheart would take care of the details of the actual research work, furnish the quarters in which the work would be done, while the cooperating agencies working through a representative board would control the work and provide the necessary funds.

It is one of the biggest projects that has ever been proposed for the betterment of the sheet metal industry, and if undertaken and carried through to completion will place the training of sheet metal mechanics on a plane very much higher than that which now obtains; it will insure competent workmen to the sheet metal industry, because these men will have been properly trained for their work.

There were twenty-two men present at the meeting, representing all phases of the sheet metal industry. And the consensus of these men was that there is a real need for the establishment of the research department as outlined by Mr. Brandt. On the other hand, Mr. Brandt pointed out that conditions at Mooseheart are ideal for the making of this institution as headquarters for such a research department. They have a well-appointed sheet metal shop, a very competent instructor, and the most necessary thing of all in such an undertaking as this, the spirit to put it over.

Ernest N. Roselle, Superintendent of Mooseheart, a man thoroughly experienced in the education of children and in vocational education, who was also present at the meeting, expressed the thought that

Mooseheart, with its wonderful equipment and spirit, has an excellent opportunity to be of greater service to the world than just the education and training for life of the 1,500 or more children that are in residence at the institution. "Apprenticeship training requires serious consideration," said Mr. Roselle, "and educators all over the country are coming to recognize that general education and educational institutions in the United States have failed in their function of training the boys and girls they turn out to become serviceable and self-supporting citizens. They are eagerly seeking to remedy the situation and will welcome any assistance they can get. They know the children are not getting out of their training what they need to equip them for life; these school superintendents are literally floundering for material that will actually train people for life."

In order to get the survey of the industry's educational needs under way, Mr. Brandon appointed a committee of nine men representing each phase of the sheet metal industry to work out the details so that the plan can be presented to the sheet metal contractors at their annual meeting at Cleveland in May.

H. J. Detmers, President of the Association of Sheet Metal Employers of Chicago, was appointed Chairman of the committee, while Verne A. Bird, Director of Education, Mooseheart, was made Secretary.

The factors to be represented on the committee are as follows: National Association of Sheet Metal Contractors, Paul L. Biersach; National Warm Air Heating and Ventilating Association, Allen W. Williams; Mooseheart, Verne A. Bird; Sheet Steel Trade Extension Committee, Harry S. Rogers; Copper & Brass Research Association, to be



appointed; American Zinc Institute, to be appointed; Sheet Metal Workers' International Association, Mr. O'Brien; the trade press, George J. Duerr, *AMERICAN ARTISAN*, and Edwin A. Scott, *Sheet Metal Worker*.

### Second Draft of Revised Uniform Mechanics' Lien Act Prepared

Announcement is made by the United States Department of Commerce that the committee appointed some time ago by Secretary Herbert Hoover to study the Mechanics' Lien Laws of the various states for the purpose of determining whether the subject is susceptible of uniform legislation has completed the second tentative draft of a uniform act.

Mechanics' lien acts are in force in all states of the Union. They are for the purpose of protecting the claims of contractors, subcontractors, material men, laborers, and others who contribute to an improvement by constituting the property improved a security for their claims while at the same time protecting the owner from payment of claims which, as to him, would be unjust. Complaints have been made that some existing laws are inequitable and that lack of uniformity causes unnecessary expense and inconvenience to those who do an interstate business and to laborers who move from state to state. At the request of various groups this advisory committee was appointed.

The committee is composed of representatives of the principal groups engaged in the construction industry. The National Conference of Commissioners on Uniform State Laws, which is interested in all questions of uniform state legislation and which is composed of officially appointed delegates from each state also has a committee studying this subject and working in close co-operation with the Department Committee.

The first tentative draft of a Uniform Mechanics' Lien Act was published in the fall of 1926 and distributed to individuals and organ-

izations known to be interested in the subject, soliciting their suggestions and criticisms. A considerable response resulted from this solicitation and in the light of these suggestions which have been carefully analyzed by the committee, the second tentative draft has been prepared.

The new draft is also to be printed and distributed for criticism. The pamphlet will be ready within the next few weeks and will be available at ten cents per copy. Anyone desiring copies may obtain them by addressing Dan H. Wheeler, Secretary, Standard State Mechanics' Lien Act Committee, Department of Commerce, Washington, D. C.

### Line Forms On the Left—New Edition of "Kinks" Now Ready

The new volume of Short Patterns, Kinks and Quick Methods for Sheet Metal Workers, by William Neubecker, has appeared to replace the well-known 2-volume edition of Kinks.

The new edition, much larger—543 pages—tells how to do easily and quickly every type of work that is likely to come into the sheet metal shop.

Slightly over the first hundred pages show how to lay out patterns without too much fuss. The chapter headings are Geometrical Figures, Using the Steel Square, Laying Out Elbows, and Short Pattern Rules.

A chapter on Devise and Equipment shows the worker how to make hundreds of handy labor-saving tools for the shop—all the way from storage racks for patterns to revolving carriers for a bench machine, chain drills, etc.

The remaining chapters are: Constructional Methods, Rules for Furnace Workers, Skylight Construction, Cornices, Gutters, Leaders, etc., Erecting Metal Ceilings, Automobile Repairing, Joining, Seaming, Riveting, etc., Estimating, Formulas.

This is a book of reference and labor-saving information that should be in every shop.

Bound in blue imitation leather, Kinks now is available from our book department. Its cost is \$5.00 postpaid.



### Lifetime Aluminum Ware

From M. B. Sleep, 435 Main Street, Darlington, Wisconsin.

Kindly advise who manufactures Lifetime aluminum ware.

Ans.—Aluminum Products Company, LaGrange, Illinois.

### Augmore Water Heater

From Hibbard, Spencer, Bartlett and Company, 211 East North Water, Chicago, Illinois.

Please advise who manufactures the Augmore water heater.

Ans. — Sands Manufacturing Company, Cleveland, Ohio.

### Phelps Lighting Plants

From C. F. Kellogg, Avoca, New York.

Please advise address of the manufacturers of Phelps lighting plants.

Ans.—Phelps Light and Power Company, Rock Island, Illinois.

### Repairs for Perfection Oil Stove

From L. E. Miller, Goodland, Indiana.

Please advise where I can obtain repairs for Perfection oil stove.

Ans.—Perfection Stove Company, 7609 Platt Avenue, Cleveland, Ohio.

### Aluminum Elbows for Acid Tanks

From E. Williger, 360 West Superior Street, Chicago, Illinois.

Please advise who in Chicago manufactures aluminum elbows for acid tanks.

Ans.—Aluminum Company of America, 360 North Michigan Avenue, Chicago, Illinois.

### 3/4" Galvanized Tubing, 28 or 30 Gauge

From A. J. Van, 410 Dousman Street, Green Bay, Wisconsin.

Where can I obtain some 3/4" galvanized tubing, 28 or 30 gauge?

Ans.—Seamless Tube Company of Wisconsin, 80 East Jackson Boulevard, Chicago, Illinois.

### Dockash Stoves and Ranges

From Oakland Foundry Company, Belleville, Illinois.

Please advise us who manufactures Dockash stoves and ranges.

Ans.—Scranton Stove Works, Scranton, Pennsylvania.



## Random Notes and Sketches

*By Sidney Arnold*

"The essence of humor is sensibility; warm, tender fellow-feeling with all forms of existence."—Carlyle.

### Letters We Might Have Had in History If the Practice of Getting Testimonials from Celebrities Had Started a Little Earlier

Ye Elizabethan Cleaning Shoppe,  
Tufftham-on-the-Thames.

Good Gentlemen:

My cloak came back from your cleanery bearing no trace of the mire in which it was steeped, to permit the passage of our good Queen Bess. I have recommended your work to many of those at court, and several have asked me whether you are proficient at removing stains from royal 'scutcheons. I called their attention to the slogan which our own Will Shakespeare has phrased for you—"Out Damned Spot"—and these gentlemen will no doubt call on your services soon.

Sincerely,

WALTER RALEIGH.

\* \* \*

Early American Cereals Co.,  
Boston, Mass.

Gentlemen:

May I add my experience to prove your famous slogan, "A Good Horse Knows His Oats."

Last Wednesday night, before starting on my ride to warn the Colonists, I fed my horse an extra portion of your Energy Oats. I am sure that it is due to this fact that he was able to endure the gruelling test of his long and difficult ride. Energy Oats is the only brand I will have in my stable from now on.

Very truly yours,

PAUL REVERE.

\* \* \*

### Best He Could Do

Harvey Manny, Robinson Furnace Company Chicago, rushing into the newspaper office: "See here, you've published an announcement of my death by mistake. That's got to be fixed up somehow!"

Editor, Helvitian Globe Trotter: "Well, we never contradict anything we have published, but I'll tell you

what I'll do. I'll put you in the births column tomorrow and give you a fresh start."

\* \* \*

A real estate salesman of Arizona had just finished describing the glorious opportunities of that part of the country. "All Arizona needs to become the garden spot of the world," he said, "is good people and water."

"Huh!" replied George Harms. "That's all hell needs."

\* \* \*

In the course of the trial the judge turned to the negro woman on the stand and asked: "How old are you?"

"I'se 73, jedge."

"Are you sure?"

"Yass, suh."

"Mandy, you don't look 73."

"I'se sure, jedge."

After a few moments the trial was interrupted by Mandy. "Jedge, suh, I was wrong when I said my age was 73; tha's my bust measure."

\* \* \*

W. C. Markle (to shopman): "I say-aw-could you take that yellow tie with the pink spots out of the show-window for me?"

Shopman: "Certainly, sir. Pleased to take anything out of the window any time, sir."

Mr. Markle: "Thanks awfully. The beastly thing bothaws me every time I pass. Good mawning."

\* \* \*

Admiring Customer—Where did you find this wonderful follow-up system. It would get money out of anyone.

A. E. Rudolphi (Rudy himself of the Rudy Furnace Co.)—I simply compile and adapt the letters my boy sends me from college.

\* \* \*

Rudy Jobst on the scale was eagerly watched by two small boys.

He dropped in his cent, but the machine was out of order and only registered 75 pounds.

"Good night, Bill," gasped one of the youngsters in amazement. He's hollow!"

\* \* \*

Misses Margaret and Dorothy Robinson, daughters of A. H. Robinson, Massillon, Ohio, and a friend, Miss Dorothy Williams, Cleveland, Ohio, honored us with a visit one day this week. Later they went to many of the points of interest about Chicago accompanied by our manager, Miss Cohn.

\* \* \*

### And He Lost the Case

A young lawyer had been retained by a farmer to prosecute a railroad for the loss of twenty-four hogs. He wanted to impress the jury with the magnitude of the case.

"Twenty-four hogs, gentlemen," he said, "just think! Twenty-four—twice the number there are in the jury box."

\* \* \*

### Not Worth Drinking

Ralph Blanchard, President Hart & Cooley, stopped to change tires in a desolate region in the far west.

"I suppose," he remarked to a native onlooker, "that even in these parts of the country the bare necessities of life have risen tremendously in price."

"You're right, stranger," replied the native gloomily, "and it ain't worth drinking when you get it."

\* \* \*

### "Be What You Is"

Don't be what you ain't;

Jes' be what you is,

'Cause if you is not what you am,

Den you am not what you is;

If you is jes' a little tadpole,

Don't try to be a frog;

If you is jes' de tail,

Don't try to wag de dog.

You can always pass de plate

If you can't exhort and preach;

If you is jes' a pebble,

Don't try to be de beach.

Don't be what you ain't,

Jes' be what you is,

'Cause de man dat plays it square

Am gwine to get his.

It ain't what you is has been

It's what you now am is.

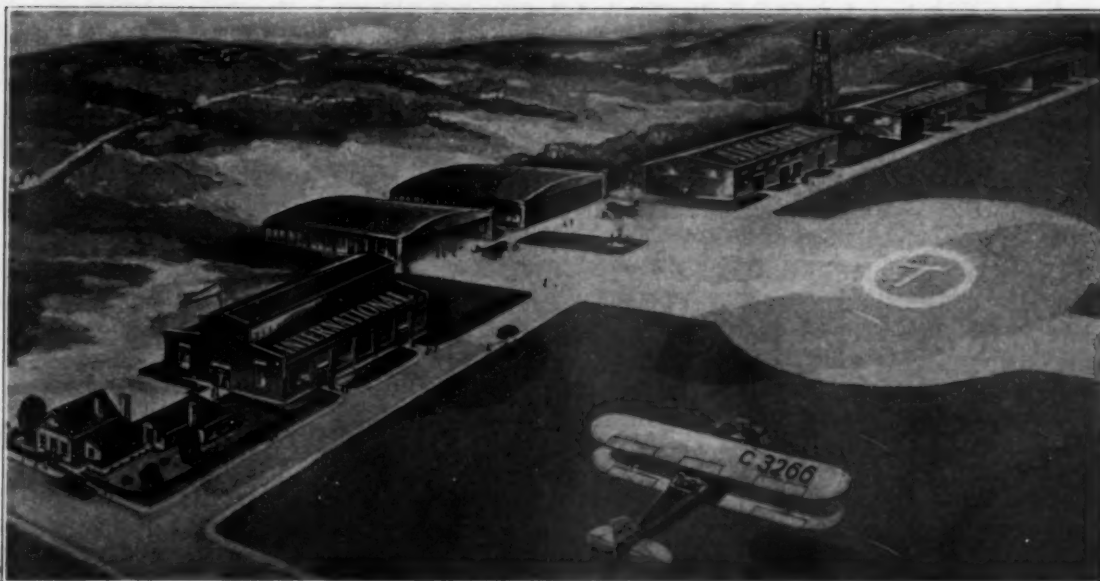


Illustration of the International Air Craft Corporation, Anchor, Ohio, Where Warm Air Furnaces Are Doing Service in Heating the Plants

## Aeroplane Manufacturing Plant Represents *NEW* MARKET FOR WARM AIR FURNACES

*Nine Warm Air Heating Units Take Care of Int. Aircraft Corp. Heating Requirements*

THE warm air heating industry is forging ahead as rapidly as the public becomes familiar with the superior merits of the products which this industry has to offer. As warm air heating engineers become more conversant with the warm air heating system, its capabilities, as well as its shortcomings, they are emboldened to put it to work in situations which were entirely unheard of or unthought of a few years ago. New industries are

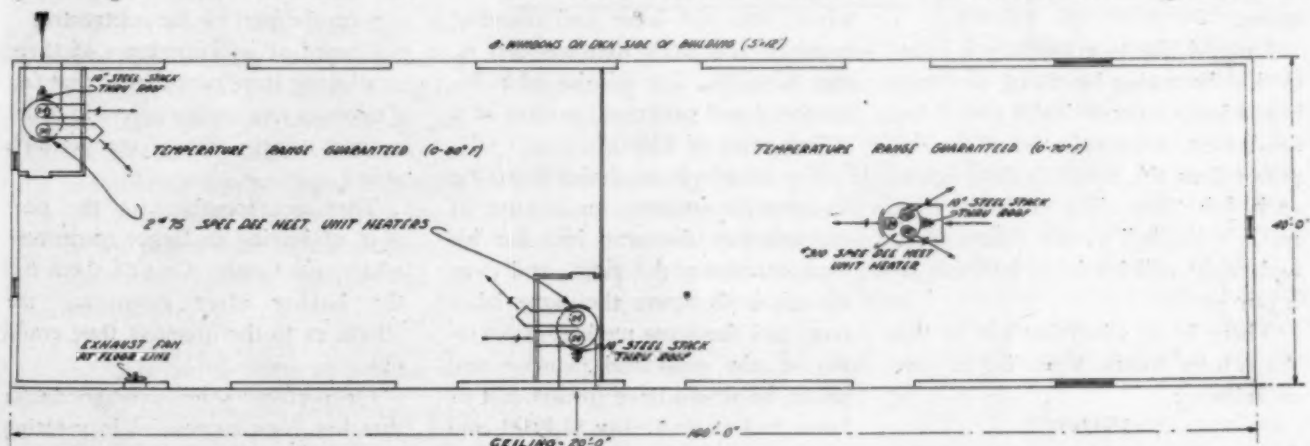
springing up and the manufacturing processes involved call for special heating requirements, and in supplying these the warm air heating system is doing its full share of the work.

The most notable instance of a new market opening up for the warm air heating products is the aeroplane manufacturing industry, the wings of which require special doping and drying processes.

At Anchor, Ohio, the Interna-

tional Aircraft Corporation is engaging in the manufacturing of aeroplanes on a commercial basis. There are four manufacturing buildings in the plant in which warm air heating systems have been installed. These buildings are approximately 50 feet wide by 160 feet long, with 20-foot ceilings, or about 64,000 cubic feet to be heated. They are of concrete construction, having a large amount of glass.

In addition to taking care of the



Layout of One of the Buildings of the International Air Craft Corporation, Anchor, Ohio, Showing Location of Heating Units



heating requirements of these four buildings, there are special requirements which the system must meet, one end of one of the buildings is being used as a spray room where the wings of the planes are doped and dried. This drying process requires a considerably higher temperature than that in the other buildings, but the warm air furnace has been found easily capable of adaptation to the most exacting requirements in this respect.

The accompanying sketch shows a partial arrangement in this building. The room is provided with an exhaust fan at the floor level to carry away the paint fumes. The temperature requirement in this paint spraying end of the building is 80 degrees and to supply that two Heavy Duty Williamson heaters, equipped with Spee-Dee-Heat fans, have been installed.

In all, nine furnaces have been

installed in this plant, four of which are of the heavy duty type and the other five are 30-inch cast furnaces. They are all equipped with fans having capacity to deliver 3600 C. F. M.

These furnaces are installed directly on the concrete floors of the buildings, with screened warm air shoes containing the fans conveniently placed.

This is one of the largest warm air heating installation in that section. Warm air was especially adapted to this installation because the buildings are not joined together, thus creating the necessity of constructing a central heating plant in case steam were used for heating purposes. In this case the cost of the warm air heating units amounted to not more than one-fourth of a steam system of similar capacity, and the warm air system is much more flexible.

## *"Furnace Salesman" Offers Solution to Mr. Fadner's Problem in Meeting Big Fellows*

*Justifies Large Dealers in Giving Public Benefit of Quantity Discounts*

**H**AVE read the articles by Mr. Jones and Mr. Fadner in regard to "price cutting."

These two articles describe conditions which exist in the furnace business in every large city.

It does not apply to the furnace business alone, however. Big business in all lines is crowding the smaller firms; for example, take the small grocery stores and the chain stores.

I would like to contribute a little to this discussion by trying to show how a large volume dealer can, if he so desires, always be lower in his prices than the small dealer, figure each job "according to the estimator's Hoyle," as Mr. Jones says, and might still be doing business at a fair profit.

There is an advertisement in the AMERICAN ARTISAN reading in part as follows:

\$56.00

(Less your cash and quantity discounts)

This means that one dealer can buy this furnace for \$56.00 plus freight, another 10% less in carload lots, another 10 and 10 less, and possibly another dealer buying 100 or more furnaces, a still better price.

Let us use this information to see how it affects the figuring of a small job, such as a 5-room house with bath.

The average dealer, a carload buyer, lists the labor and material required and finds that his cost is, say, \$145.00. To this he adds his overhead and profit and arrives at a selling price of \$198.00.

The large volume dealer is paying less for his furnace, on account of the quantity discount, less for his register, pipe and fittings, and even though both figure the same labor cost, and the same method in arriving at the overhead expense and profit, he would have for his cost of labor and material, say \$130.00, and arrive at a selling price of \$180.00.

A less than carload dealer, using

exactly the same labor cost and the same method of figuring, would arrive at a selling price of \$210.00.

The general contractor would then have the following figures to consider on his job:

Large volume dealer.....	\$180.00
Average dealer.....	198.00
Less than carload dealer...	210.00

Each of the three dealers in submitting their estimates tell the contractor that they are doing nothing but the best kind of work and the job will be installed according to standard code.

If you were the general contractor on this job and the owner had not insisted on any particular make of furnace, to whom would you let the contract?

Now this large volume dealer is not going to enter into any price agreement with his competitor.

He had his books audited last year and they show a reasonable profit. This type of work keeps up his volume and he gets a better price on replace jobs to swell his profits.

There is another large volume dealer in town that worries him more than the small dealer. If he were to raise his price, the other fellow would get the job.

And the average dealer, even though he is buying in carload lots, cannot expect to meet this competition with price.

It is necessary for him to get the owner to specify his furnace before letting the general contract, or agree to pay the difference in the price. If this is done before the general contract is let, it avoids any objection on the part of the contractor.

I heard of an experience of three small drug store proprietors that felt it necessary to reduce prices in order to meet a large volume competitor's prices.

They got together for the purpose of buying in larger quantities, under one name. One of them did the buying after consulting the others as to the quantity they could use.

Or perhaps some average dealer that has been successful in meeting this type of competition will tell how he does it.



# VALUE OF BUILDING INSULATION TO REDUCE HEAT LOSSES

By E. N. SANBERN\*

THERE is hardly a man present who has not at some time in his life come across a paragraph in a specification in which the following words occurred, although they may differ slightly in arrangement: "The contractor shall guarantee to heat the building to 70 degrees in zero weather."

No self-respecting engineer would today issue a specification with this clause. That it is meaningless from an engineering point of view is quite obvious to any one who understands heating and ventilating. There was, however, a time when the use of this clause very closely approached 100 per cent of the specifications issued.

In the days before the society had been formed, and in the days of its infancy, the common rule for figuring the heat loss was, first, cubic contents, afterward the Mills rule and then the Carpenter rule. But today heat loss can be determined with reasonable accuracy, if the type of construction is known, and the workmanship is good. In the future, instead of the heating contractor being held responsible for the heating of the building, the heating contractor will be in a position to demand that the building contractor so construct his building that the heat loss be that which the engineer figures it should be.

*The Guide*, 1928, American Society of Heating and Ventilating Engineers, has a number of tables that are very accurate as to the B.t.u. loss through various types of building construction, insulation and other materials, and has a number of pages showing the amount of losses for various combinations of structures.

\*Paper on the value of building insulation to reduce heat losses presented at the annual meeting of the American Society of Heating and Ventilating Engineers at New York, by E. N. Sanbern, Engineer, Mensing & Company, Philadelphia.

The heat loss coefficients that are given in the 1928 issue of *The Guide* are from such eminent authorities as U. S. Bureau of Standards, Willard, Lichty and Harding, Peebles, Norton and others.

P. Nicholls, formerly of the Society's Research Laboratory at Pittsburgh, developed a meter that can be installed in any room and the actual heat loss through an ex-

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*Members of the Greater Chicago Warm Air Heating Association were treated to a lecture on insulating materials at a recent meeting. In the accompanying article, which encompasses a paper prepared by E. N. Sanbern for the meeting of the American Society of Heating and Ventilating Engineers, the method of determining the heat loss factors for various materials is outlined. It will be noted that reference to the cost of insulating and the advisability of insulating has been made. This article can be read and studied with profit by all members of the warm air heating fraternity who are anxious to enlarge their scope of usefulness in the industry.*

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isting wall or other structure can be determined to a degree of accuracy that would have been deemed impossible a few years ago. It will, therefore, readily be seen that if the engineer can determine by calculation what the heat loss should be and after the construction check these conditions, he will stand on firm scientific, as well as practical, ground, and then demand that the building be constructed to limit the escape of heat.

The heating engineer is not only being faced with the problem of

properly heating the building, but also of insulating it. This problem of insulation is one that cannot be solved by the architect or building contractor. The mere application of insulating material to a building will not give the owner of the building the answer to his problem; for, as can readily be seen, should the cost of insulating material be such that it would be cheaper to burn coal than insulate the building, it would be a waste of money to insulate.

Insulation from a commercial standpoint is not a problem of saving coal, but of saving dollars in the first and operating cost, and, although coal costs money, there is a distinction as well as a difference. It is the purpose of this paper to try to show how the problem of insulation of a building should be approached that the owner may receive the greatest possible benefit per dollar of expenditure.

Before going into the problem of insulation some of the terms used in the B.t.u. method of calculation will be defined.

Heat losses from building occur through the building construction by radiation, conduction and convection. Heat always passes from a higher to a lower temperature. If the temperatures are the same on both sides of the wall there will be no transfer of heat. Therefore, the greater the temperature difference the greater the rate of heat transfer. Take for example, a room with 13-inch brick wall furred and plastered, one wall exposed and heated with a direct cast-iron steam radiator. The steam in the radiator being of a higher temperature and in contact with the cast iron, the heat passes through the cast iron by conduction and is given off on the outside of the radiator by radiation and convection.

Radiation passes from the radiator in straight lines, through the air, without appreciably heating it, to

the walls and other objects in the room, giving up its heat to them. The air in contact with the radiator absorbs heat and by its difference in temperature will circulate through the room, giving up its heat to the cooler wall and objects. This is called convection.

The heat has now been traced to the walls. There being only one exposed wall, this is the only one in which any transfer of heat will take place. The inside plaster wall has received its heat by radiation and convection, and will transfer the heat by conduction through the plaster to the furred space, where it will again pass through the air in the furred space by radiation and convection to the inside surface of the brick wall, and then through the brick wall by conduction, and be given off on the outside of the brick wall by radiation and convection. There is a drop in temperature through each of the various steps just described.

The combined coefficient of radiation and convection in the examples to follow will be called  $K$ , and the coefficient of conduction will be called  $C$ . The infiltration of air around the doors and windows must also be considered and just a brief description of how the coefficients for the various materials are obtained will be given.

There are two methods used at present; one is called the hot box and the other the hot plate. With the hot-box method there are two boxes, one smaller than the other. The smaller one contains the heating elements and is built inside of the larger one. Both boxes have one open end in the same plane and open into a room that is cooled by a refrigerating system. The material to be tested is placed over the open ends of the boxes. After the temperatures are adjusted so that the rate of heat flow is constant, the engineer can by the use of instruments and thermocouples get the coefficients desired. In the hot-plate method there is a heating element either an electrical or steam hot plate with the material to be tested placed on each side of the plate, and a cooling section again placed on

the outside of the two test sections. These sections are all clamped together. By measuring the temperatures in the hot plate and in the cooling plate, the rate of heat transfer is obtained. There is one thing that should be done that is not being done now, and that is to test the material at the temperatures they are going to be used.

It is known today that by insulating a wall or roof with some kind of insulating material quite a saving in heat loss is possible. Everyone knows that cork is a good insulating material, but rather expensive. There are on the market today insulating materials that equal or very closely approach the insulating qualities of cork and they are cheaper, and in many cases more easily applied. Insulation may be classified under five different headings as follows:

1. The loose or dry, powdery type.
2. The poured or gypsum base, where the material is mixed with water and poured into place with forms.
3. The quilted, where the material is stitched between two layers of paper or some similar material.
4. The felted, where the material is in a semi-pliable condition and very similar to a heavy felt.
5. The board or semi-rigid type, which is often used in place of lumber.

The various types of insulators having been defined, now consider some of the places they might be used. It is very essential to pick the proper insulator for a specific job. All insulating materials have their use, but any one particular kind will not answer for every purpose.

There is one important thing to remember, and that is, there are no insulators known that will not absorb moisture if brought in contact with it, and some insulators will absorb more than others. Then, if a room or factory in which the process of manufacture either requires or results in a high humidity, the insulator should be protected by some waterproof material. The

walls and ceiling construction are naturally cooler than the air in the room and will cool the air. If the air is cooled down to the dew point, water will be deposited on the surface of the insulator. When the insulator absorbs moisture, its insulating value is practically destroyed.

Vermin is another thing to be considered in using an insulator. If the product being manufactured in the building will attract vermin, then an insulator should be used that will not harbor them, and one that is difficult for them to destroy.

Fire hazard is another question to be considered. If the risk is great, it is better to use an insulator that is fire retarding. Some of the insulators on the market today are either fire retarding or slow burning.

For a practical problem consider a small factory of modern construction. The walls are usually of brick or concrete without any furring or plaster on the inside. This makes it almost impossible to do anything in the way of insulating without considerable extra expense. It is hard to justify insulation on the walls of a modern factory, as the exposed glass area will run anywhere from 50 to 75 per cent of the total exposed wall area. This does not leave much wall surface to be insulated. One square foot of glass in this type of construction is equal in heat loss to about 4 square feet of 13-inch plain brick wall, which shows that the window is the greatest source of heat loss. The window problem is a big one and until heavier and better windows that will not leak or warp are made, the engineer is helpless. There is one place in the factory that insulation can and should be used, and that is on the roof. As there is a higher temperature at the ceiling, naturally there is a greater heat loss at this point which justifies the use of insulation.

In the home, the wall construction is such that it is easier to install insulation, as the glass area will vary from 15 to 25 per cent of the total wall, depending on the design. This gives a larger percentage of wall surface to insulate. The home is a place for comfort and engineers are



justified in spending a little more here than on the factory wall. Insulation not only saves fuel, but tends to give a more uniform temperature throughout the house and helps to stop infiltration through the wall. In tests made at the A. S. H. & V. E. Research Laboratory, it is shown that a 13-inch plain brick wall under pressure of a 15-mile wind will leak about  $7\frac{1}{2}$  cubic feet of air per hour per square foot of wall surface. This same 13-inch brick wall with furring and plaster will leak about 0.21 cubic feet of air per hour per square foot of wall, and by using insulation this leakage should be still further reduced. This alone means quite a saving.

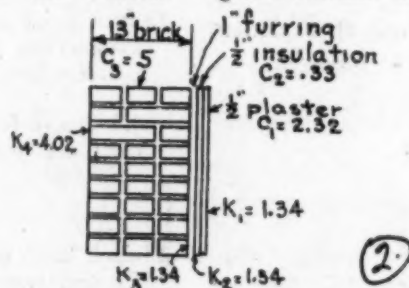
In school the walls are often of such construction that insulation can be easily applied. Here the glass area will run about 45 to 55 per cent of the total wall. Insulation cannot be justified, if it is necessary to go to too much extra expense. That statement applies to the climate of Philadelphia and the use of cheap fuel. If the cost of fuel is high, and the temperature difference is great, it is very much easier to justify the use of an insulator, as will be seen later in this paper.

Where should the insulator be placed in the wall? The best way to install the insulation from the standpoint of efficiency of heat transmissions is to place it in the center of an air space, so that it will divide the air space into two smaller air spaces. This gives what is commonly called two dead air spaces. Still air is a very good insulator, but due to methods of building construction, it is almost impossible to get still air. When heat is applied to one side of the wall it is trans-

mitted through the material by radiation and conduction and the air next to the warm wall becomes heated and starts to circulate, giving up its heat to the cold wall by convection. Just what the correct

homes are heated by electricity, so that will give a very good check on the present figures.

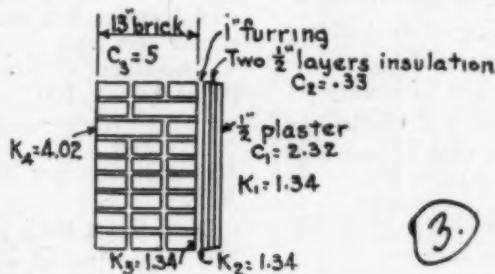
A few examples to see if insulation can be made to pay will be given. Assume that the building has



$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{x_1}{C_1} + \frac{x_2}{C_2} + \frac{x_3}{C_3}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{.5}{2.32} + \frac{.5}{.33} + \frac{13}{5}} = \frac{1}{6.818} = .147$$

width an air space should be is not known, but it is thought that about 1 inch is correct for most materials. The materials facing the air space would have some effect on the width. If strips could be placed in the air

13-inch brick walls with furring, metal lath and  $\frac{3}{4}$  inch of plaster. The first thing to figure will be the heat loss constants using the coefficients  $K$  and  $C$  that were obtained by tests on the materials in question.



$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{x_1}{C_1} + \frac{x_2}{C_2} + \frac{x_3}{C_3}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{.5}{2.32} + \frac{1}{.33} + \frac{13}{5}} = \frac{1}{8.333} = .120$$

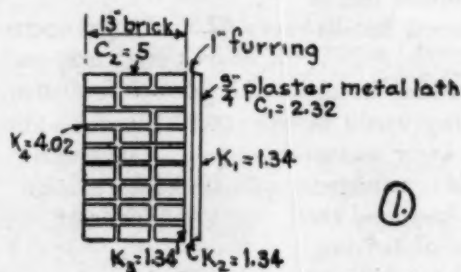
space, dividing the wall into several smaller spaces, it would tend to cut down the convection currents. The laboratory at Pittsburgh has been running some tests with the heat meter in some of the homes of the Westinghouse employees. These

Now take a 13-inch brick wall, furring with  $\frac{1}{2}$  inch of insulation used as a plaster base and a  $\frac{1}{2}$  inch plaster.

Then take a 13-inch brick wall with 1 inch of insulation used as a plaster base and  $\frac{1}{2}$  inch of plaster.

Now that the heat constants have been obtained, the cost of construction of the various walls must be investigated. The cost of the brick wall will be the same in all cases, and the only cost that must be considered is the difference in the cost of the metal lath and plaster, and the insulation as a plaster base with plaster.

The cost of the metal lath construction is as follows:  
Plaster ... \$1.35



$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{x_1}{C_1} + \frac{x_2}{C_2} + \frac{x_3}{C_3}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{.75}{2.32} + \frac{13}{5}} = \frac{1}{5.41} = .185$$



Metal lath. 0.20  
Labor .... 0.20

\$1.75 per sq. yd. or  
\$19.44 per 100 sq.  
ft.

The cost of  $\frac{1}{2}$  inch of insulation  
as a plaster base is as follows:

Plaster ...\$1.15  
 $\frac{1}{2}$  inch in-  
sulation.. 0.50  
Labor .... 0.10  
Wire ..... 0.15

\$1.90 per sq. yd. or  
\$21.11 per 100 sq.  
ft.

The wire referred to in the ex-  
ample is the ordinary galvanized  
chicken wire with about a 1-inch  
mesh. This is stretched tight over  
and nailed to the plaster base insu-  
lation. This is done to prevent large  
cracks in the plaster at the joints in  
the insulation. If the wire is not  
used and if there is any vibration,  
shrinking or settling of the building  
material, the plaster will crack at the  
joints. The wire acts as a reinforcing  
for the plaster and divides the  
cracks up so that they appear only  
as very fine hair cracks.

Doubling the thickness of insula-  
tion, the cost is as follows:

Plaster ...\$1.15  
2 layers in-  
sulation.. 1.00  
Labor .... 0.20  
Wire ..... 0.15

\$2.50 per sq. yd. or  
\$27.77 per 100 sq.  
ft.

The cost of fuel will be taken on  
the basis of  $2\frac{1}{4}$  tons of coal per 100  
square feet of steam radiation per  
heating season of 210 days, or  
0.0225 tons for 1 square foot per  
year. As a basis, take No. 1 buck-  
wheat coal at \$7.50 a ton. Then  
 $0.0225 \times 7.50 = \$0.169$  per square  
foot per heating season. The cost  
of radiation will be \$2.00 per square  
foot in place. The amount of radi-  
ation for the different types of wall  
considered are as follows:

$0.185 \times 70 \times 100$   
Metal lath —————  
240

### 13-inch brick wall with metal lath:

Plaster, metal lath.....\$19.44  
5.4 square feet radiation at \$2.00.. 10.80  
Coal per year, 5.4 square feet at  
\$0.169 .....

\$0.54 Depreciation  
0.91 Fuel cost

\$30.24

\$1.45 Annual operating cost

### 13-inch brick wall with one layer of $\frac{1}{2}$ -inch insulation:

Plaster, one  $\frac{1}{2}$ -inch layer insulation  
and wire .....\$21.11  
4.3 square feet radiation at \$2.00.. 8.60  
Coal per year, 4.3 square feet at  
\$0.169 .....

\$0.10 Interest additional  
building investment  
0.43 Depreciation

0.73 Fuel cost

\$29.71

\$1.26 Annual operating cost

### 13-inch brick wall with two layers of $\frac{1}{2}$ -inch insulation:

Plaster, two  $\frac{1}{2}$ -inch layers insula-  
tion and wire.....\$27.77  
3.5 square feet radiation at \$2.00.. 7.00  
Coal per year, 3.5 square feet at  
\$0.169 .....

\$0.50 Interest  
0.35 Depreciation  
0.59 Fuel cost

\$34.77

\$1.44 Annual operating cost

5.4 square feet radiation per 100  
square feet wall.

$$0.147 \times 70 \times 100$$

$\frac{1}{2}$ -in. insulation

240

= 4.3 square feet radiation per 100  
square feet wall.

Two layers insulation

$$0.120 \times 70 \times 100$$

240

= 3.5 square  
feet radiation per 100 square feet  
wall.

Now figure the cost per year per  
100 square feet of wall, considering  
the cost of fuel, interest at 6 per  
cent on additional building invest-  
ment and depreciation on the heat-  
ing system over a 20-year period.  
This will give a comparison of the  
cost of 100 square feet of wall.

The figures used here on the costs  
of plastering were obtained from a  
reputable firm of plasterers in  
Philadelphia.

In the example given the wall  
with  $\frac{1}{2}$ -inch layer of insulation at a  
cost of \$1.26 per 100 square feet of  
wall will give the cheapest installa-  
tion.

Nothing has been added in the  
figures for taxes as they would be  
constant. The tax assessor seldom  
knows how the wall is constructed.  
His figure is usually based on the  
size, location and type of building.

Depreciation on the additional  
building investment has not been fig-  
ured in for the following reasons:  
The U. S. income tax return does

not allow a person to figure depre-  
ciation on his home, but does allow  
2 per cent on factories and other  
buildings. It is very seldom that a  
building lives its full useful life, due  
to obsolescence. A building may  
become obsolete for the purpose for  
which it was built and be torn down  
and replaced by a different type of  
building at a time when the walls  
were as good as when built. It  
would be hard to say what figure to  
use for obsolescence. Should any  
one care to add these factors, they  
should be added in with the inter-  
est on the additional building invest-  
ment.

In the example, should the cal-  
culations have been figured the use  
of a fuel costing \$15.00 per ton the  
annual operating costs would then  
be:

### 13-inch brick wall with metal lath:

\$0.54 Depreciation  
1.82 Fuel cost

\$2.36 Annual operating cost

### 13-inch brick wall with one layer of $\frac{1}{2}$ -inch insulation:

\$0.10 Interest additional building  
investment  
0.43 Depreciation  
1.46 Fuel cost

\$1.99 Annual operating cost

### 13-inch brick wall with two layers of $\frac{1}{2}$ -inch insulation:

\$0.50 Interest

0.35 Depreciation  
1.18 Fuel cost

\$2.03 Annual operating cost

In the example cited, using \$15.00 per ton fuel, the wall with only 1/2-inch layer of insulation will give the cheapest installation.

thing that will be of interest. Take, for example, a roof of the following construction, one that is common in the Philadelphia home. Tar paper, slag, 1-inch roof boards, 2x6 joist with the lath and plaster ceiling suspended on 2x4 inch. The air space will vary from 12 to 24 inches. The

be greater, as the temperature increases about 1 degree per foot of height, and with an 8 foot 6 inch ceiling and a temperature of 70 degrees at the 5-foot line, the temperature at the ceiling will be about 74 degrees. The amount of radiation for the different types of ceilings are as follows:

$$\text{Metal lath } \frac{0.258 \times 74 \times 100}{240} =$$

7.96 square feet radiation per 100 square feet ceiling.

$$\frac{1}{2}\text{-in. insulation } \frac{0.189 \times 74 \times 100}{240}$$

= 5.83 square feet radiation per 100 square feet ceiling.

Two layers insulation  
 $0.147 \times 74 \times 100$

= 4.53 square feet radiation per 100 square feet ceiling.

Now figure the cost per year per 100 square feet of ceiling, considering the cost of fuel, interest at 6 per cent on additional building investment and depreciation on the heating system over a 20-year period. This will give a comparison of the cost of 100 square feet of ceiling. The price of coal and the cost of radiation in place and the cost of plastering will be figured the same as in the previous examples for walls.

In the foregoing examples for ceilings, the one with the one 1/2-inch layer of insulation and a cost of \$1.68 per 100 square feet of ceiling will give the cheapest installation.

In the case of the ceiling, using fuel at \$15.00 per ton, the annual operating costs would be:

Ceiling with metal lath:

\$0.80 Depreciation  
2.70 Fuel cost

\$3.50 Annual operating cost

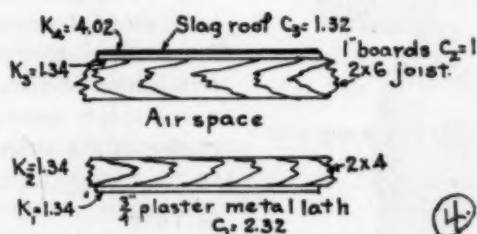
Ceiling with one layer of 1/2-inch insulation:

\$0.10 Interest  
0.59 Depreciation  
1.98 Fuel cost

\$2.67 Annual operating cost

Ceiling with two 1/2-inch layers of insulation:

\$0.50 Interest



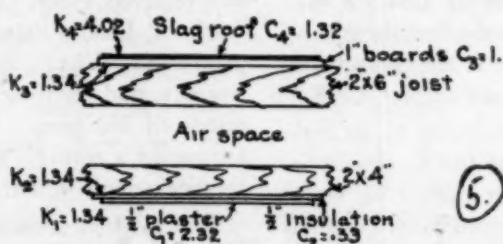
$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{1}{2.32} + \frac{1}{1} + \frac{1}{1.32}} = \frac{1}{3.875} = .258$$

There is one thing that the author wants to make clear, and that is that this is only a *method* of figuring. Every case should be figured and proved out. The figures used here are not correct for every location and type of construction, but may be varied to suit local conditions and types of construction. Any or all

heat loss on such a roof is as follows:

The same roof with 1/2-inch layer of insulation as a plaster base will give a heat loss constant as follows:

Now the same roof with two 1/2-inch layers of insulation and plaster will be figured. The heat loss constant will then be as follows:

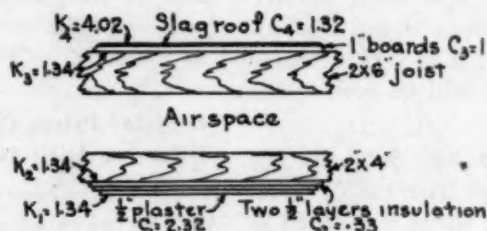


$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{1}{2.32} + \frac{1}{1} + \frac{1}{.33} + \frac{1}{1.32}} = \frac{1}{5.283} = .189$$

figures may be changed, such as cost of radiation, cost of fuel, depreciation on heating system, rate of interest on additional building investment or the cost of building construction.

The ceiling will also show some-

The cost of the various ceiling constructions will be the same, for the only thing that is being changed is the plaster and plaster base. Now the amount of radiation that each ceiling requires can be determined. Here the temperature difference will



$$U = \frac{1}{\frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} + \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4}} = \frac{1}{\frac{1}{1.34} + \frac{1}{4.02} + \frac{1}{2.32} + \frac{1}{1} + \frac{1}{.33} + \frac{1}{1.32}} = \frac{1}{6.798} = .147$$



*Ceiling with metal lath:*

Plaster metal lath.....	\$19.44		
7.96 square feet radiation at \$2.00..	15.92	\$0.80	Depreciation
Coal per year, 7.96 square feet at \$0.169 .....		1.35	Fuel cost
	<hr/> \$35.36		
		\$2.15	Annual operating cost

*Ceiling with one layer of 1/2-inch insulation:*

Plaster, 1/2-inch layer insulation and wire .....	\$21.11	\$0.10	Interest
5.83 square feet radiation at \$2.00..	11.66	0.59	Depreciation
Coal per year, 5.83 square feet at \$0.169 .....		0.99	Fuel cost
	<hr/> \$32.77		
		\$1.68	Annual operating cost

*Ceiling with two 1/2-inch layers of insulation:*

Plaster, 2 layers 1/2-inch insulation..	\$27.77	\$0.50	Interest
4.53 square feet radiation at \$2.00..	9.06	0.45	Depreciation
Coal per year, 4.53 square feet at \$0.169 .....		0.77	Fuel cost
	<hr/> \$36.83		
		\$1.72	Annual operating cost

0.45 Depreciation

1.54 Fuel cost

---

\$2.49 Annual operating cost

In the examples for ceiling, using fuel at \$15 per ton, the two with 1/2-inch layers of insulation will give the cheapest installation.

This is a very fair way to make the comparison, as the saving in the cost of fuel, saving in cost of radiation, saving in depreciation on radiation and the interest on the additional building investment have all been taken into consideration.

Insulation will also help to keep a house cooler in the summer by reducing the radiant heat from the sun through the wall and roof. There has been no attempt made to figure or show what this value would be in this paper.

Some engineers no doubt will not agree with me on the figures used in the problems, but they have been taken from *The Guide*, 1928, which is very complete, and has a lot of new heat transmission factors and tables, so it will not be necessary to figure them out as we have done in this case. *The Guide* is rapidly becoming the leading textbook in the heating and ventilating field, and I hope the time will soon come when everyone will use it as a standard, so all of us will be working on the same basis.

**Discussion**

R. H. Heilman: I have not had a chance to read this paper thor-

oughly, but there is one item I have noted which is worthy of discussion. This is the matter of surface resistance. At the bottom of page 4 Mr. Sanbern calculates the heat transmission through a 13-inch brick wall with furring, metal lath and 3/4-inch plaster.

He uses a value of 1.34 for  $K_1$ ,  $K_2$  and  $K_3$ , or for the first three surfaces. This value is not correct for  $K_3$  and probably not correct for  $K_1$ .

If we assume 1.34 for  $K_2$  as correct, then the value for  $K_3$  should be considerably lower than 1.34, since  $K$  is the combined coefficient of radiation and convection. The radiation from one surface to another depends upon the difference of the fourth powers of the absolute temperatures of the two surfaces and, therefore, for the radiation alone the factor for surface (2) is tied up with surface (3) and cannot be separated. Since the radiation is at least 50 per cent of the total heat loss, it leaves only 50 per cent for the convection loss from surface (3) and  $K_3$  should be only 0.67 instead of 1.34. It is very probable that the value will be even lower than 0.67.

Mr. Sanbern has no doubt obtained his values from the A. S. H. & V. E. Guide, where it is stated in Chapter I, page 11: "In the case of air space construction, two additional surface coefficients for each air space must be inserted in either

equation (5) or (6). These surface coefficients may be taken the same as  $K_1$  (still air) values for the materials forming the sides of the air spaces."

The change in the total heat transfer by using the correct surface values may be relatively small in some cases, but may become quite important in other cases, and the determination of the correct values to use is surely worthy of the consideration of the society.

**Is Your Team Thinking Success?**

A business gets there, makes good, arrives, because someone is getting ideas over to those employed in it. Success is seldom the result of chance; instead it is usually the direct result of a thinking organization primed to do the right thing at the right time, the Anchor Man says.

The boss of an outfit is much like a coach of a ball team. Pop Warner received credit for the brain work of Leland-Stanford's victory over Pitt. Why? Because he put strategy and fighting spirit in the minds of his gang. Is your outfit a gang or a team? There is a difference—don't you think?

Pop Warner's success lies in his ability to inspire and direct the actions of football players. He does it with ideas. Your gang can be made over into a team of workers, which will aid in building a profitable business, provided they are getting the proper training. Ideas, training their thoughts on the solving of your problems—use of time, developing sales, understanding overhead expense, and the conservation of net profits—with an eye to assuring their own success as well as yours.

**Register Prices Change Effective April 1st**

There have been numerous changes in the prices of warm air furnace registers that will go into effect on and after April 1, 1928. These changes in register prices will be found on page 216 this issue.





ized sheet prevented the excessive moisture from coming up through to the furnace.

"The above tests were made on furnaces with a one-piece base and ring combined, which made it rather convenient in putting the galvanized sheet into place. However, the same could be done on other furnaces without resetting them. We have found that this idea will work when all others fail. It is understood that the water pan can be used successfully after this change has been made.

"This information might help some of your readers who are having trouble with the same problem."

#### **New Furnace Catalog and Heating Manual Issued by The Fox Furnace Company**

A new 40-page catalog, devoted to the complete line of Sunbeam furnaces, has been released by the Fox Furnace Company, Elyria, Ohio. It is also a heating manual, containing heating information, tabulations and formulae based on the Standard Code. Space has also been used to give valuable installation suggestions and instructions from a practical, experienced furnace installer.

Description of the new, improved Sunbeam Warm-air Furnaces, 1000 Series, is presented in this catalog, showing the latest in furnace construction. A number of cross-section illustrations have been incorporated to show clearly the new type of Sunbeam furnace.

From the one-piece radiator down to the one-piece base, all are fully described. Important features in the feed section and ash pit, which extend through the front of the furnace, with doors and door openings machine-ground to insure an airtight fit, are pointed out.

Bearing out the assertion that "there is a Sunbeam furnace for every heating requirement," the manufacturers also illustrate and describe the "C" and "B" Series furnaces, which have been available heretofore. These include pipe and pipeless types, furnished with triangular or flat (dumping) grates.

The new Sunbeam catalog is

bound in a rich black, with the printed cover design in scarlet and gold. Color has been freely used on the reading pages to produce a very attractive result.

Dealers who wish to receive a copy should send their requests to the Fox Furnace Company, Elyria, Ohio.

#### **American Gas Association Begins Construction of New Testing Laboratory at Cleveland, Ohio**

The corner stone of the new \$150,000 testing laboratory at Cleveland, Ohio, of the American Gas Association was laid by President O. H. Fogg with fitting ceremonies on March 15, 1928, in the presence of representatives of a number of gas appliance manufacturing companies in Cleveland.

R. W. Gallagher, chairman of the Managing Committee of the Laboratory, opened the ceremony with a brief talk outlining the steps previously taken to bring the Laboratory to Cleveland and make it a permanent institution. He paid tribute to the manufacturer company members of the Association who have been loyal supporters of the Laboratory movement and have helped immeasurably to make it a success.

The temporary quarters of the Laboratory at plant No. 2 of the East Ohio Gas Company were established in May, 1925, Mr. Gallagher said, and since that time a total of more than 7,300 appliances have been tested and approved for public use.

The new building will make available about 30,000 square feet of space as against the 12,000 square feet of space now available in the temporary quarters.

#### **Here's New Way of Presenting Standard Code to Salesmen**

James H. Keeler, Jr., of the Hood Furnace & Supply Company, Corning, New York, has worked out a clever way of presenting the Standard Code, and in sending it on to AMERICAN ARTISAN, he writes as follows:

"To AMERICAN ARTISAN:

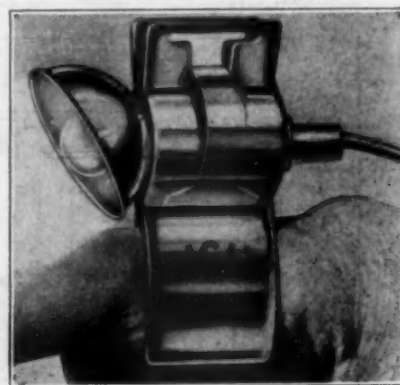
"I feel as though this important message, written in but a few words, should be passed along to the sales representatives of the warm air heating industry as a whole.

"S—EE  
T—HAT  
A—LL  
N—EW  
D—EALERS  
A—CCEPT  
R—ELIABLE  
D—EPENDABLE

C—ODE  
O—FFERING  
D—ESIRABLE HEAT  
E—CONOMICALLY."

#### **Novel Electric Finger Lamp Makes Its Appearance**

"Digit," the finger lamp with the handy clamp, is now on the market. And, truly, it "fills a long felt want," says the Digit Manufacturing Co., 272 Lafayette Street, New York, N. Y., for Digit makes it possible for every flashlight user to have both



**The Light**

hands free at all times and still allows him to direct the light wherever it is needed.

The Digit finger lamp is beautifully finished in nickel, clamps comfortably and quickly on your finger or on a tool, and is the ideal all-purpose trouble lamp. For the radio, automobile or sick room; in camp or in the cellar; for dentists, draughtsmen, plumbers or cops; everybody needs it. Retail at only 75 cents, complete with 2.5 volt



Mazda bulb and 4 feet of cord. Digit is a patented novelty light that sells on sight, and gives handsome profits to the dealers who display it properly.

The automobilist, with the aid of the Digit converter, equipped with 6-volt Mazda bulb plugged into any dashboard socket, has the ideal signaling and trouble lamp. Digit can also be used in conjunction with the electric cigar lighter by simply removing the lighter tip and inserting the Digit plug, thereby giving a "finger clamp trouble lamp" with a cord length of about 9 feet. The Digit converter retails for only 35 cents complete with 6-volt Mazda bulb. The Digit finger lamp has its sales and manufacturing quarters at 272 Lafayette Street, New York, known as the Digit Manufacturing Company.

#### University Libraries 100 Per Cent In Their Desire for American Artisan

Here is an interesting bit of news that shows how well AMERICAN ARTISAN is thought of even outside of the trade. A short time ago, wishing to know whether or not AMERICAN ARTISAN was proving of value in the libraries of fifty universities in all parts of the country, our circulation department wrote to the librarians of these universities asking them whether or not they were finding AMERICAN ARTISAN of sufficient value to have it continued. And fifty answers were received all in the affirmative.

A typical reply is that of John C. French, Librarian of Johns Hopkins University, Baltimore, Maryland, "We shall be grateful if you will continue sending us AMERICAN ARTISAN." L. M. Bryant, Serial Recorder of Yale University, New Haven, Connecticut, writes, "We shall be very glad if you will retain the Yale University library on your mailing list for AMERICAN ARTISAN." The librarian of the University of Colorado writes, "Our engineering faculty and students will appreciate your continuing the courtesy in presenting your esteemed journal." An so on from

all parts of the country came a 100 per cent return with the request to be retained on the list.

#### Cleveland Convention Program to Be Best Ever

According to reports reaching the convention headquarters of the National Association of Sheet Metal Contractors and the Ohio Sheet Metal Contractors' Association in Cleveland, the Cleveland convention, May 22nd to 25th, inclusive, is going to make a record for itself in attendance.

The fact that Cleveland can be reached overnight from any point east of the Mississippi is one of the contributing factors. Already, various associations throughout the country are organizing parties and will travel to Cleveland in special Pullmans, thus contributing to the enjoyment of the trip.

Those towns with small groups are being picked up on the way by the groups of larger cities so that when the train rolls into the convention city there will be unloaded as happy a bunch of sheet metal men as ever attended the annual get-together.

#### Heating Surface of Warm Air Heater Defined

In the Measurement of Furnace Activity the Research Advisory Committee have defined what constitutes Heating Surface as follows:

"Heating Surface is that surface within the furnace casing which is exposed to the fire or the products of combustion on one side and to the air on the other."

"Measure the bottom inside diameter of the firepot above the grates making measurement on 4 diameters and to accuracy of  $\frac{1}{8}$ " . . . If the grate level is below the ashpit joint include as heating surface the vertical portion of the ashpit above the grate level. . . . Cemented joints on the outside of castings are to be included as heating surface. . . . When surfaces so irregular as to be impossible of linear measurement are found they may be meas-

ured by fitting paper templates, to cover the surface, and planimetering these papers. . . . Fins when integral parts of a furnace casting are to be measured as follows:

- (a) The first 2 inches allowed in full.
- (b) The next 2 inches a half area.
- (c) All beyond 4 inches no allowance.

"Webs, lugs, ribs, and other small structural parts which are integral with the main heating elements of the furnace are included as heating surface."—*National Warm Air Heating Bulletin*.



American Oil Burner Association, Hotel Stevens, Chicago, April 3, 4 and 5, 1928. Headquarters, 350 Madison Avenue, New York; Leod D. Becker, Managing Director.

Illinois Sheet Metal Contractors' Association, Fort Armstrong Hotel, Rock Island, April 11 and 12. Secretary Fred J. Graeff, 222 East Washington Street, Springfield, Illinois.

Southern Hardware Jobbers Association, American Hardware Manufacturers Association, Edgewater Gulf Hotel, Biloxi, Mississippi, April 16 to 19, 1928. Secretary-Treasurer John Donnan, 923 American National Bank Building, Richmond, Virginia.

National Warm Air Heating and Ventilating Association, Hotel Stevens, Chicago, Illinois, April 24, 25 and 26, 1928. Secretary Allen W. Williams, 174 East Long Street, Columbus, Ohio.

Texas Sheet Metal Contractors' Association, Houston, Texas, May 7 and 8, 1928. Secretary, Harry L. Stanyer, 2422 Alamo Street, Dallas.

Arkansas Retail Hardware Association, Little Rock, during the month of May, exact dates for the meeting to be determined later. L. P. Biggs, secretary, 815-16 Southern Trust Building, Little Rock.

National Association of Manufacturers of Heating and Cooking Appliances, Hotel Statler, Detroit, Michigan, May 16 and 17, 1928. Secretary Allen W. Williams, 174 East Long Street, Columbus, Ohio.

National Association of Sheet Metal Contractors of the United States, the Ohio Sheet Metal Contractors' Association, joint convention, Hotel Statler, Cleveland, Ohio, May 22, 23, 24 and 25, 1928. J. M. Saunders, 215 Plymouth Building, Cleveland, Ohio, convention chairman.

Pennsylvania Sheet Metal Contractors' Association and Distributors' and Salesmen's Auxiliary, June 19, 20 and 21, 1928, Hotel Lawrence, Erie, Pennsylvania. Secretary, W. F. Angermeyer, 7253 Frankstown avenue, Pittsburgh, Pa.



# March Leaves Steel Industry Confident—Light Products Offset Slight Lag in Heavy Lines

## High Consumption Rate of Pig Iron Is Promising—Nonferrous Metal Market Firm

**F**INISHED steel remains steady through an ebb and flow of specifications according to products and of operations as to districts. A more spotted market situation seems in the making, but March leaves the industry about where it found it—which is saying much for its inherent strength—and majority opinion over the immediate outlook is confident.

The upward trend in prices on some products having been arrested, specifications against expiring contracts are not quite so brisk as anticipated. Light products, especially sheets, tin plate and strip, have filled the breach as heavy steel demand lags slightly. The price situation is largely a matter of viewpoint, concessions from open market quotations often representing advances over first quarter contracts.

Railroad equipment and line pipe buying has improved moderately, but building steel, as for several weeks, is better in the prospect than in actual awards. Tractor production is broadening at a time when tillage tool output is subsiding. Steel Corporation subsidiaries are averaging 90 per cent, a gain of  $1\frac{1}{2}$  points this week, and the entire industry 83 per cent.

### Pig Iron

At Pittsburgh, after a slight setback last week, with sales as low as \$17.25, valley, the market for bessemer pig iron again has rebounded on the strength of several sales at \$17.50, minimum. A few single carload orders are noted at the latter price, as well as sale of 200 tons or more at a time. One local roll foundry closed for 225 tons at \$17.50, valley, and a machine tool builder in Providence, R. I., on a \$6.43 freight rate, also placed 200 tons at the same figure.

Shipments of pig iron in Chicago-Milwaukee territory are continuing

at the top mark of the past four months, indicating steady consumption. Recent spot activity indicates melters were conservative in anticipating first quarter requirements.

The price of \$18.50, Chicago furnace, for No. 2 foundry and malleable is steady for second quarter. A lot of 250 tons of charcoal iron for a steel producer in this district was split among several sellers at \$24, furnace. Silvery sales are extremely light.

Several tonnages of pig iron have been sold in this district for delivery by boat from Buffalo. A Buffalo district steel producer sold iron at the Chicago market price of \$18.50, base, to be shipped with steel cargoes when navigation opens.

Books for second quarter pig iron have been opened by the three principal merchant blast furnace producers at \$16, base, Birmingham. This is a reaffirmation of the first quarter price. Sales are comparatively small and slow, owing to lack of the usual seasonal buying by local cast iron pipe concerns.

### Copper

Some copper sold almost down to 14 cents, Connecticut, at the same time that other sales were made a few points higher. A small producer did a fair amount of business at 14.07½ cents and then assumed a firmer position. In the past few days several sales have been made at 14.12½ cents, Connecticut.

### Tin

A sudden upward rush in the price carried the tin market from 50 cents on March 13 to almost 54 cents on March 23. Buying was large in this period, with users and dealers buying mostly for early arrival, but also taking some positions as far ahead as September. As soon as buying support was discontinued the market began to sag and went below 53 cents. In other words, it

appears that professional traders have not yet sufficient faith in the market to assume long accounts to give the market support in its quiet spells.

### Zinc

Prime western zinc is firmer, mostly on account of recent strength in ore. This situation, however, has not resulted in as great stimulus to buying by galvanizers as had been expected. The ore market slipped back to \$38 a ton this week, but this easing of \$1 to \$2 is not expected to undermine the firmness of the metal, as the margin between metal and ore remains extremely narrow.

Users of zinc appear covered on immediate needs. Routine business is being done. The base price of sheet zinc has been reduced \$1.00 to \$8.50 per 100 pounds, effective as of March 26.

### Lead

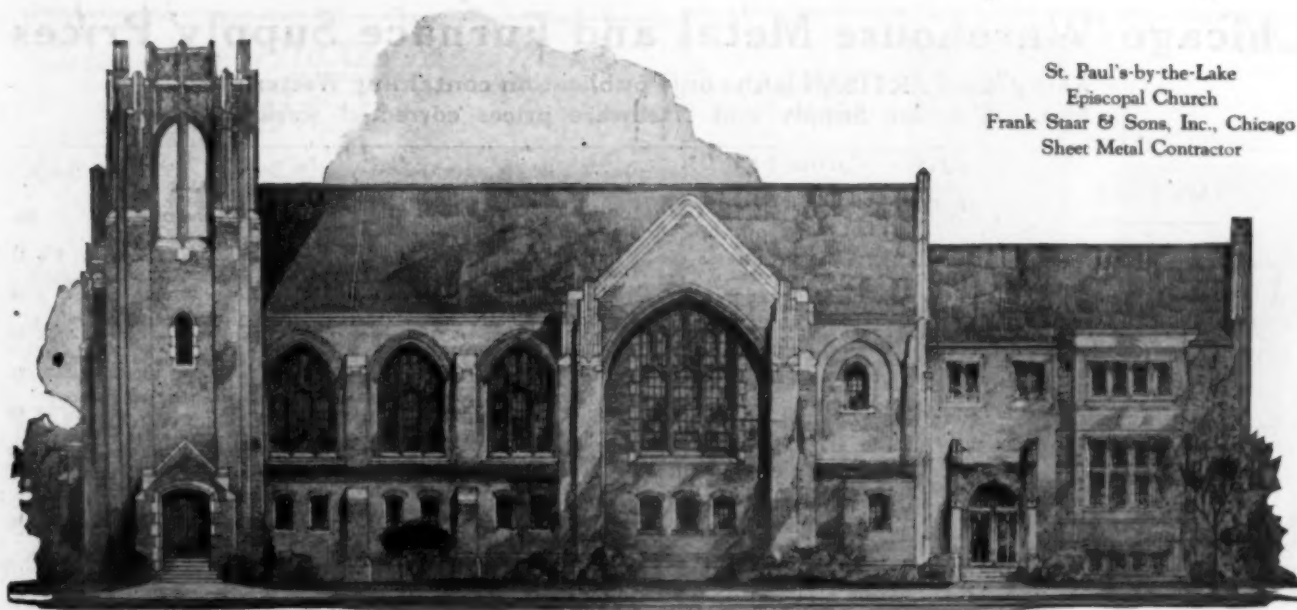
The lead market looks a little firmer now than a week ago. Base price is unchanged at 6 cents, New York, but whereas the St. Louis price was a flat 6.80 cents, it now is 6.80 cents to 6.85 cents. The top price was done in the past week, especially in the middle west.

### Solder

Chicago warehouse prices on solder are as follows: Warranted 50-50, \$33.50; Commercial 45-55, \$30.50; plumbers', \$27.50; all per 100 pounds.

### Old Metals

Wholesale quotations in the Chicago district, which should be considered as nominal, are as follows: Old steel axles, \$16.00 to \$16.50; old iron axles, \$21.50 to \$22.00; steel springs, \$15.00 to \$15.50; No. 1 wrought iron, \$11.00 to \$11.50; No. 1 cast, \$12.75 to \$13.25, all per net tons. Prices for non-ferrous metals are quoted as follows, per pound: Light copper, 9 cents; zinc,  $3\frac{1}{2}$  cents; cast aluminum,  $13\frac{3}{4}$  cents.



St. Paul's-by-the-Lake  
Episcopal Church  
Frank Staar & Sons, Inc., Chicago  
Sheet Metal Contractor

## "ANACONDA ROOFING COPPER THE BEST—REGARDLESS OF PRICE"

—FRED V. PRATHER, Architect, Chicago

"When it came to the selection of all exposed metal roofing material for the new St. Paul's-by-the-Lake Episcopal Church, Rogers Park, Chicago, I specified Anaconda Copper because of its quality and economical features. My opinion was formed as the result of many interviews with sheet metal contractors, relative to the best grade of copper to use, regardless of price."—(Signed) Fred V. Prather, Architect.

Pure Copper is the most economical material for roofing purposes because it lasts indefinitely. Anaconda Copper is guaranteed 99.9% pure—yet Anaconda costs no more than good copper should.

THE AMERICAN BRASS COMPANY

GENERAL OFFICES: WATERBURY, CONNECTICUT

Canadian Mill: ANACONDA AMERICAN BRASS LIMITED, New Toronto, Ont.

# ANACONDA COPPER

# BRASS ANACONDA BRONZE



Mention AMERICAN ARTISAN in your reply—Thank you!



# Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly

## METALS

### FIG IRON

Chicago Fdy.,	
No. 2	\$18 50
Southern Fdy. No. 2	22 01
Lake Superior Charcoal	27 04
Malleable	18 50

### FIRST QUALITY BRIGHT TIN PLATES

1C	20x28 112 sheets	\$25 10
IX	20x28	29 60
IXX	20x28 56 sheets	16 20
IXXX	20x28	17 95
IXXXX	20x28	18 95

### TERNE PLATES

IC	20x28, 40-lb. 112 sheets	\$25 00
IX	20x28, 40-lb. 112 sheets	27 75
IC	20x28, 25-lb. 112 sheets	21 15
IX	20x28, 25-lb. 112 sheets	23 80
IC	20x28, 20-lb. 112 sheets	19 55
IV	20x28, 20-lb. 112 sheets	22 05
IC	20x28, 15-lb. 112 sheets	18 05

### "ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including	
1/4 in.—100 lbs.	\$4 55

### COKE PLATES

Cokes, 80 lbs., base, 20x28	\$13 60
Cokes, 90 lbs., base, 20x28	13 80
Cokes, 100 lbs., base, 20x28	14 00
Cokes, 107 lbs., base, IC	
20x28	14 30
Cokes, 135 lbs., base, IX	
20x28	16 40
Cokes, 155 lbs., base, 56	
sheets	9 20
Cokes, 175 lbs., base, 56	
sheets	10 05
Cokes, 195 lbs., base, 56	
sheets	10 90

### BLUE ANNEALED SHEETS

Base 10 ga.	per 100 lbs. \$3 50
"Armco" 10 ga.	per 100 lbs. 4 00

### ONE PASS COLD ROLLED

#### BLACK

No. 18-20	per 100 lbs. \$3 75
No. 22	per 100 lbs. 3 90
No. 24	per 100 lbs. 3 95
No. 26	per 100 lbs. 4 05
No. 27	per 100 lbs. 4 10
No. 28	per 100 lbs. 4 20
No. 29	per 100 lbs. 4 35
No. 30	per 100 lbs. 4 45

### "ARMCO" GALVANIZED

"Armco" 24	per 100 lbs. \$6 15
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### GALVANIZED

No. 16	per 100 lbs. \$4 30
No. 18	per 100 lbs. 4 45
No. 20	per 100 lbs. 4 60
No. 22	per 100 lbs. 4 65
No. 24	per 100 lbs. 4 80
No. 26	per 100 lbs. 5 05
No. 27	per 100 lbs. 5 15
No. 28	per 100 lbs. 5 20
No. 30	per 100 lbs. 5 70

### BAR SOLDER

Warranted	
50-50	per 100 lbs. \$33 50

### Commercial

45-55	per 100 lbs. 30 50
Plumbers	per 100 lbs. 27 50

### ZINC

In Slabs	\$ 8 50
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### SHEET ZINC

Cash Lots (600 lbs.)	\$12 00
Sheet Lots	12 00

### BRASS

Sheets, Chicago base	17 1/2c
Mill base	18c
Tubing, brazed base	26 1/2c
Wire, base	18 1/2c
Rods, base	16 1/2c

### COPPER

Sheets, Chicago base	24c
Mill base	23c
Tubing, seamless base	25 1/2c
Wire, No. 9, B & S Ga.	18 1/2c
Wire, No. 10, B & S Ga.	19c
Wire, No. 11, B & S Ga.	19 1/2c
Wire, No. 12, B & S Ga. and heavier	19 1/2c

## LEAD

American Pig	\$7 00
Bar	8 00

## TIN

Pig Tin	per 100 lbs. \$59 00
Bar Tin	per 100 lbs. 60 00

## HARDWARE, SHEET METAL SUPPLIES, WARM AIR FURNACE FITTINGS AND ACCESSORIES.

### ASBESTOS

Paper up to 1/16	6c per lb.
Roll board	5 1/2c per lb.
Mill board 2/32 to 1/8	5c per lb.
Corrugated Paper (250 sq. ft. to roll)	\$6 00 per roll

### BRUSHES

Furnace Pipe Cleaning	
Bristle, with handle, each	\$0 75

### Flue Cleaning

Steel only, each	1 25
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### BURRS

Copper Burrs only	40-2 1/4%
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### CEMENT, FURNACE

American Seal, 5-lb. cans, net	\$ 45
American Seal, 10-lb. cans, net	85
American Seal, 25-lb. cans, net	2 25
Pecora	per 100 lbs. 7 50

### CHIMNEY TOPS

Adams' Revolving	
4 in.	21 lbs. \$11 00
6 in.	24 lbs. 11 50
7 in.	30 lbs. 12 50
8 in.	33 lbs. 15 00
9 in.	51 lbs. 16 50
10 in.	54 lbs. 18 00
12 in.	66 lbs. 22 00
14 in.	110 lbs. 36 00

### CLINKER TONGS

Each	\$0 75
Per doz.	8 40

### CLIPS

Damper	
No-Rivet Steel, with tail	
pieces, per gross	\$9 50
Rivet Steel, with tail	
pieces, per gross	7 50
Tail pieces, per gross	3 40

### COPPERS—Soldering

#### Pointed Roofing

3 lb. and heavier	per lb. 40c
2 1/2 lb.	per lb. 45c
2 lb.	per lb. 48c
1 1/2 lb.	per lb. 55c
1 lb.	per lb. 60c

### CORNICE BRAKES

Chicago Steel Bending	
Nos. 1 to 6B	Net

### CUT-OFFS

Gal., plain, round or cor. rd.	
26 gauge	30%
28 gauge	35%

### DAMPERS

"Yankee" Hot Air	
7 inch, each 20c, doz.	\$1 50
8 inch, each 25c, doz.	2 20
9 inch, each 30c, doz.	2 60
10 inch, each 32c, doz.	2 80

Smoke Pipe	
7 inch, doz.	\$1 60
8 inch, doz.	2 20
9 inch, doz.	2 00
10 inch, doz.	2 75
12 inch, doz.	4 50

### ADAMS No. 1 CHECK

Check and Collar Complete	
8 inch, each	2 00
9 inch, each	2 25

### End Check Only

8 inch, each	1 60
9 inch, each	1 85

### Collar Only

8 inch, each	50
9 inch, each	65

### No. 2 CHECK

8 inch, each	1 00
9 inch, each	1 00

### 10% Disc. on Adams No. 1

### Diamond Smoke Pipe

7 inch, doz.	\$ 2 00
8 inch, doz.	3 20
9 inch, doz.	4 80
10 inch, doz.	6 00

## Adams' Sheet Metal

7 inch, doz.	\$ 1 60
8 inch, doz.	2 20
9 inch, doz.	2 60
10 inch, doz.	2 80
12 inch, doz.	3 50
14 inch, doz.	5 00

## EAVES TROUGH

Galv. Crimpedge, crated 75 & 5%	
Zinc, "Barnes"	60%

## ELBOWS

Conductor Pipe	
Galv. plain or corrugated, round flat Crimp.	
28 Gauge	60%
26 Gauge	45%
24 Gauge	15%

## Galv. & Terne Steel

Plain Rd. and Rd. Corr.:	
28 Ga.	60%
26 Ga.	45%
24 Ga.	15%

## Square Corrugated

No. 28 Gauge	50%
26 Gauge	35%

## Fortico Elbows

Standard Gauge Conductor Pipe, plain or corrugated.	
Not nested	70 & 5%
Nested Solid	70 & 5%

## Sq. Corr., A. & B. & Octagon

28 Ga.	50%
26 Ga.	35%

## Fortico

1", 1 1/4", 1 1/2"	45%
--------------------	-----

## Copper

16 oz., all designs	50%
---------------------	-----

## Zinc—

All styles	60%
------------	-----

## ELBOWS—Stove Pipe

1-piece Corrugated, Uniform Blue	
"Milcor" No. 28 Gauge, Doz.	
5-inch	\$1 65
6-inch	1 20
7-inch	1 75

## Special Corrugated

6-inch	\$1 00
7-inch	1 60

## Adjustable—Uniform Blue

"Milcor" No. 28 Gauge, Uniform Blue,	
5-inch	\$1 65
6-inch	1 75
7-inch	2 10

## WOOD FACES—50% off list.

## FENCE

726-6-12 1/4 (100 rods)	\$28 68
1948-6-14 1/4 (100 rods)	43 62

## FILES AND RASPS

Heller's (American)	50-10%
American	60-10%
Arcade	50%
Black Diamond	50%
Eagle	50%
Great Western	50%
Kearney & Foot	50%
McClellan	50%
Nicholson	50%
Simonds	60%

## FIRE POTS

Geo. W. Diener Mfg. Co.	Pa.
No. 02 Gasoline Torch, 1 qt.	\$ 5 13
No. 0350, Kerosene, or Gasoline Torch, 1 qt.	6 50
No. 10 Tinner's Furn. Square tank, 1 gal.	11 20
No. 15 Tinner's Furn. Round tank, 1 gal.	10 70
No. 21 Gas Soldering Furnace	3 60
No. 110 Automatic Gas Soldering Furnace	10 50

## Quick Meal Stove Co.

Vesuvius, F. O. B. St. Louis 30% (Extra Disc. for large quantities.)	
--	--

## GALVANIZED WARE

Pails (Galv. after made), 10-qt.	\$2 00
Tubs (Galv. after made), No. 1	5 75
No. 2	6 50

## GLASS

Single Strength, A, 52-in. brackets	87%
Single Strength, A, 34 to 40-in. bracket	86%
Single Strength, A, all other brackets	89-5%
Double Strength, A, all sizes	89%

## HANGERS

Conductor Pipe	
Milcor Perfection Wire	25%
Milcor Triplex Wire	10%

## Eaves Trough

Milcor Steel (galv. after forming) List	plus 12 1/2%
Milcor Selflock E. T. Wire, List	plus 50%

## HOOKS

Conductor	
"Direct Drive" Wrought Iron for wood or brick	15%

## HUMIDIFIER

"Front-Rank," Automatic	
In single lots	50%
In lots of 10 or more	50-5%
In lots of 25 or more	50-10%
Vapor pans, etc., each	50%

## LIFTERS

Stove Cover	
Coppered	per gro. \$6 00
Alaska	per gro. 4 75

## MALLETS

Tinners Hickory	per doz. \$2 25
-----------------	-----------------

## MITRES

Galvanized steel mitres, 28 Ga.	70
26 Ga.	60-20

## NAILS

Cut Steel	\$4 35
Cut Iron	4 35

## Wire

Common	\$ 10
Cement Coated	3 10

(Continued on Page 216)



Labor + Material = Money  
 Save them all by  
 using Power-Saving Tools.

From a hammer to the  
 largest brake or shear—  
 if it's used by the  
 Sheet Metal Worker or  
 Furnaceman—we can  
 supply it.

There's many a short-cut  
 to added profit in new and  
up-to-date tools—and—  
right now is the best time  
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**CLEVELAND**

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 Better Balance

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Corrugated



Plain Round



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 in all styles and angles from 10 to 90  
 degrees, of 24, 26, 28 ga. ternes, then  
 galvanized after formation.

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 are the standard of the market  
 and always give satisfaction

Send for new catalogue 26 showing complete line

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P. O. Station B, Cincinnati, O.

Square  
Corrugated  
Style A



Square  
Corrugated  
Style  
B



Not made lighter than  
 28 ga. or 16 oz. copper

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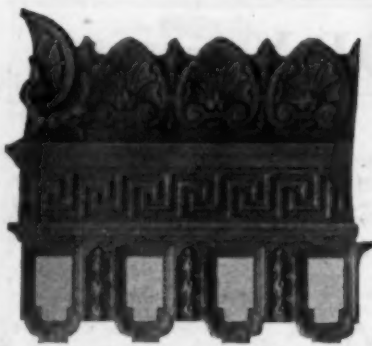
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NETTING, POULTRY		RIDGE ROLL	
Galvanized before weav- ing .....	80%	Galv., Plain Ridge Roll, b'd'd .....	75-10-5%
Galvanized after weaving. 50-10%		Galv., Plain Ridge Roll cr'd .....	75-10%
		Globe Finials for Ridge Roll. ....	60%
PASTE		SCREWS	
Asbestos Dry Paste:		Sheet Metal	
100-lb. Barrel .....	\$14 00	7, 1/4x1/8, per gross.....	\$9 53
100-lb. barrel .....	8 75	No. 10, 1/4x1/8, per gross ..	63
35-lb. pail .....	3 50	No. 14, 1/4x1/8, per gross..	33
10-lb. bag .....	1 10		
5-lb. bag .....	40		
2 1/2-lb. cartons .....	35		
POKERS, FURNACE		SHEARS, TINNERS & MACHINISTS	
Each .....	\$0 75	Viking .....	\$33 00
POKERS, STOVE		Lennox Throatless	
Nickel Plated, coll handles, per doz. ....	1 10	No. 18 .....	55%
W'r't Steel, str't or bent, per doz. ....	\$0 75	Shear blades .....	10%
		(f. a. b. Marshalltown, Iowa)	
PIPE		SHIELDS, REGISTER	
Conductor		No. 1 "Gem" floor.....	\$12 00 doz.
Cor. Rd., Plain Rd., or Sq.		No. 2 "Gem" wall.....	8 00 doz.
Galvanized		SHOES	
Crated and nested (all gauges) .....	75-2 1/4%	Galv. 22 Gauge, Plain or cor- rugated round flat crimp.....	60%
Crated and not nested (all gauges) .....	70-15%	26 gauge round flat crimp.....	45%
		24 gauge round flat crimp.....	15%
Furnace Pipe			
Double Wall Pipe and Fittings .....	50%		
Single Wall Pipe, Round Galvanized Pipe .....	50%		
Galvanized and Tin Fit- tings .....	50%		
Lead			
Per 100 lbs. ....	\$12 50		
Stove Pipe			
"Mileor" "Titelock" Uniform Blue Stove			
28 gauge, 5 inch U. C. nested .....	10 50		
28 gauge, 6 inch U. C. nested .....	11 00		
28 gauge, 7 inch U. C. nested .....	13 00		
28 gauge, 8 inch U. C. nested .....	9 00		
28 gauge, 9 inch U. C. nested .....	10 00		
28 gauge, 7 inch U. C. nested .....	12 00		
T-Joint Made up			
6-inch, 25 ga....per doz. \$ 4 00			
All Zinc			
No. 11, all styles.....	60%		
PULLEYS			
Furnace Tackle....per doz. \$0 55			
per gro. 8 50			
Furnace Screw (enameled) .....per doz. 75			
PUTTY			
Commercial Putty, 100-lb. Kits .....	\$3 50		
QUADRANTS			
Malleable Iron Damper.....	10%		
REDUCERS—Oval Stove Pipe			
Per Doz.			
1—6, 28-gauge, 1 doz. in carton .....	\$2 00		
REGISTERS AND BORDERS			
Baseboard, Floor and Wall.			
Cast Iron .....	30%		
Steel and Semi-Steel.....	40%		
Baseboard, 1 piece.....	40-20%		
Baseboard, 2 piece.....	40%		
Wall .....	40%		
Adjustable Ceiling Ventilators .....	40%		
Register Faces—Cast and Steel			
Japanned, Bronzed and Plated, 1x3 to 14x14.....	40%		
Large Register Faces—Cast, 14x14 to 38x42.....	60%		
Large Register Faces—Steel, 14x14 to 38x42.....	65%		
Ventilating Register			
Per gross .....	9 00		
Small, per pair .....	30		
Large, per pair .....	50		





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Made of  
**ZINC  
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OR  
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METAL CEILINGS

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Height of throat, 2"  
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The elimination of friction insures more work at less cost in all Whitney Punches.

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and  
sizes

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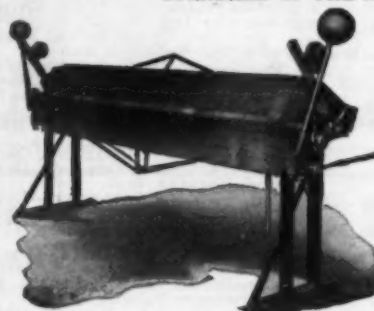
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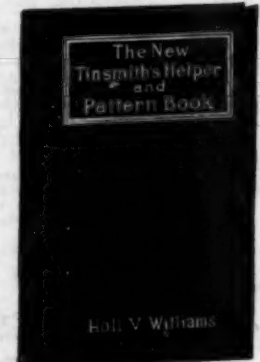
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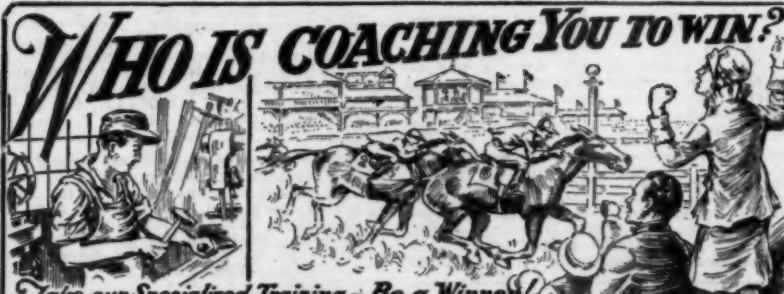
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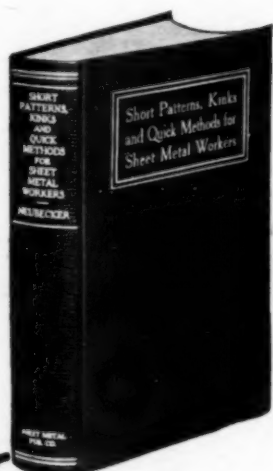
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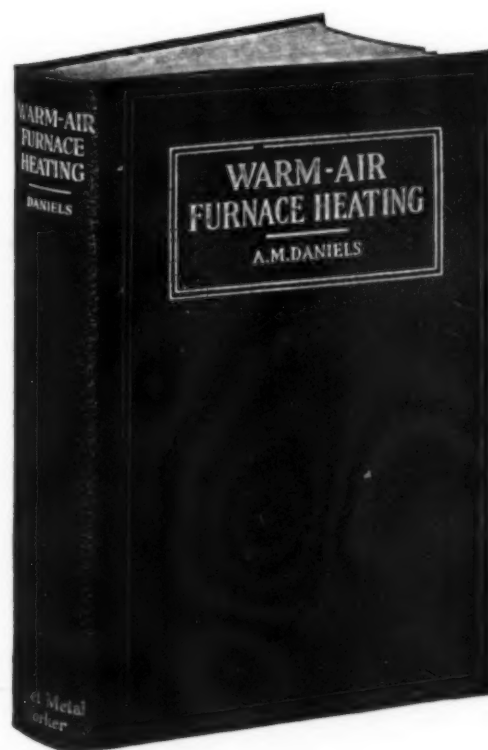
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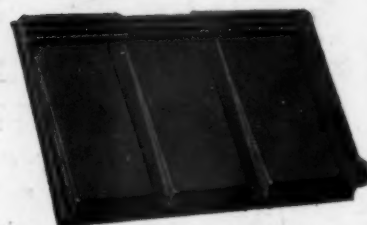
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